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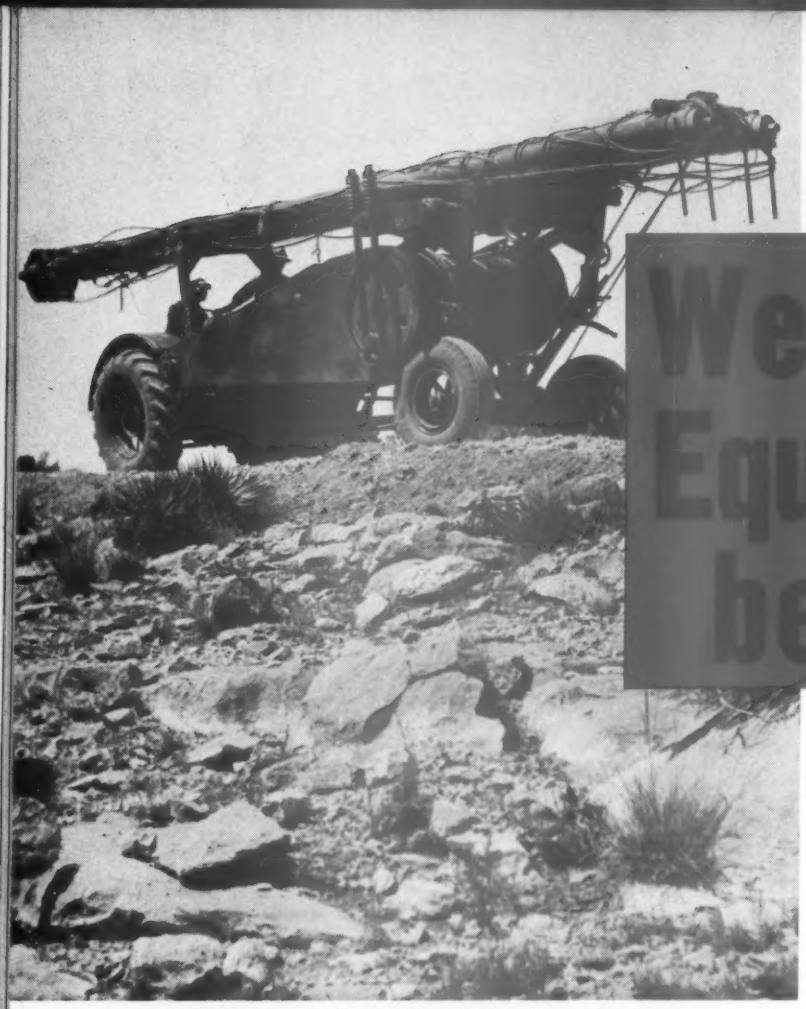
JANUARY 21, 1943



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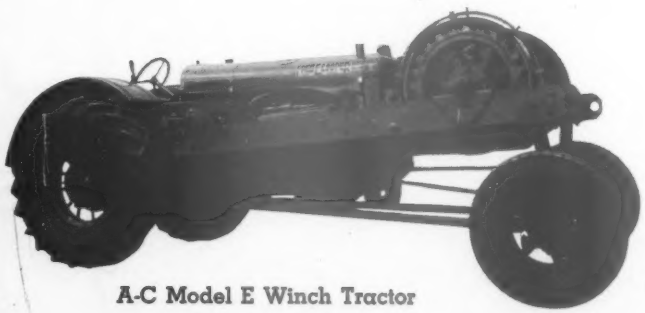

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Trends

Crude-Oil Production
By States — Page 66

CRUDE PRODUCTION 3,880,000 bbl. daily average—up 47,170 bbl. One year ago 4,044,240 bbl.

CRUDE STOCKS 232,191,000 bbl. as of Jan. 9—down 1,747,000 bbl. One year ago 244,364,000 bbl.

GASOLINE STOCKS 84,955,000 bbl. as of Jan. 16—up 710,000 bbl. One year ago 97,010,000 bbl.

RESIDUAL FUEL-OIL STOCKS 71,798,000 bbl. as of Jan. 16—down 761,000 bbl. One year ago 93,651,000.

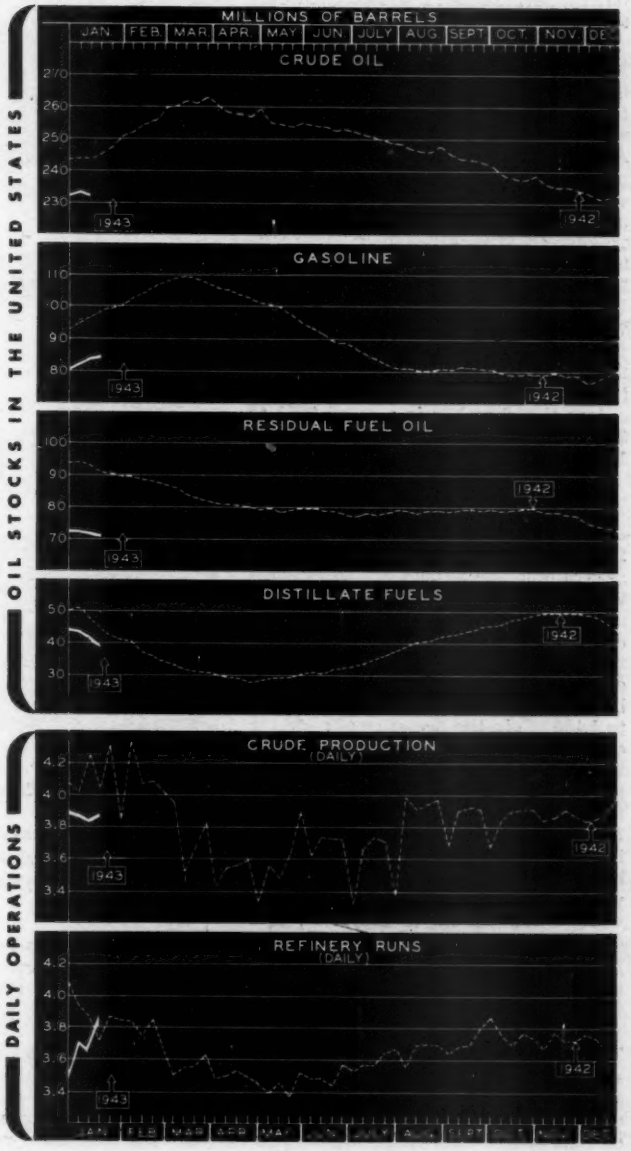
GAS OIL AND DISTILLATES 39,841,000 bbl. as of Jan. 16—down 1,526,000 bbl. One year ago 47,906,000.

REFINERY RUNS—3,640,000 bbl. daily week ended Jan. 16—down 34,000 bbl. One year ago 3,885,000.

THE tabular information and charts on this page reflect the operating position and problems of the petroleum industry after 3 weeks of a new year. The steady decline in crude-oil stocks under way since last March appears to have ended for the industry as a unit although there are important areas in which shortages are still reported. Gasoline supply has at last passed the demand and seasonal additions to storage are under way.

THE immediate problem is how to increase the production and provide for the transportation of the heavier products extending from kerosene to the lowest-gravity fuel oils. The seriousness of the residual and distillate situation is more apparent when the data on this page are broken down as to areas and production and stocks are compared with normal conditions. It is necessary first to remove the California stock figures from the totals covering the entire country. In California the present stocks of distillate and gas oil are practically the same as a year ago and inventories of residual oils are slightly higher. That state has a problem in taking care of the enlarged war demands for distillates and fuel oil, but right now it has a better inventory position than the rest of the country to support its current needs. The output of low-gravity crudes is expanding.

EAST of California stocks of residual fuel oils are 43 per cent under a year ago and lower than they have been at any time in several years. Inventories of distillate and gas oil are 22 per cent less than they were at the start of 1942 and the lowest for that date since 1939. The principal difficulty so far as the eastern part of the United States is concerned is sufficient transportation to move the fuel oil and distillate from sources of supply in the Middle West and Southwest. There is also the matter of changing yields at refineries so that the output of the heavier oils can be increased. Representatives of the war agencies point to the current operating data as proof of their contention that if crude runs to stills are increased without changes in yields in order to secure the required distillate and fuel oil, there will shortly be an overproduction of the domestic grades of motor fuels. The supply-demand situation in regard to the heavier oils is serious enough at this time in several areas that additional revisions in plant operations and transportation plans are in prospect for the immediate future.



Eastern Seaboard's First Fluid Catalyic Cracking Plant Dedicated This Week

NEW YORK.—The first fluid catalytic cracking plant on the eastern seaboard located at Standard Oil Co. of New Jersey's 100,000-bbl. refinery at Bayway, N. J., was dedicated January 18 before a group of Army and Navy officers, officials of the company, and refinery employes. Charging and production capacity of the 235-ft. high unit was not disclosed but some operating details, previously secret, were revealed for a group of newspapermen and trade-journal editors.

Previous to the dedication, E. V. Murphree, vice president, Standard Oil Development Co., explained the process with the aid of a flow chart and scale model. Gas oil of 27° to 35° A.P.I. gravity is charged to the vaporizing furnace of the cracker. These vapors are fed to the reactor through a pipe into which the catalyst in powder form is introduced. The reactor is a vessel 15 ft. in diameter and 28 ft. high with perforated plate in its hopper-shaped base, through which the catalyst bearing vapors pass to insure even distribution in the reaction chamber. The temperature of the catalyst-vapor mass as it enters the chamber is around 800° to 975° F., and it is pumped in under 10-lb. pressure.

Removal of Catalyst

Carbon-coated catalyst is removed from the vapors in a series of cyclone separators. The vapors are introduced tangentially into the cone-shaped separators. The separated catalyst drops down into the used catalyst chamber from which it passes to the regeneration chamber where the carbon is burned off at temperatures of 1,000° to 1,150° F. in the presence of a stream of air. Catalyst leaving the regeneration chamber is separated from gases produced in regeneration in three more cyclone separators and a Cottrell precipitator. Regenerated catalyst falls into a clean catalyst chamber from which it is fed through a valve controlling the flow into the vapor stream from the furnace, thus completing the cycle.

Catalyst-free vapors pass to a fractionating tower nearly 100 ft. high, 16 ft. in diameter in the bottom section and 13.5 ft. in the top section. Two grades of fuel oil are taken off while fixed and other gases boiling at or under 400° F. down to normal motor-fuel components pass to a condenser, where everything above propane and perhaps some butanes and butylenes are condensed. The uncondensed portion goes to a gas-absorption plant where constituents are removed for use individually or in other refining processes.

Distillate from the condenser, principally propane, propylene, normal butylene, isobutylene, normal butane, isopentane, and all other compounds boiling up to 400° F., goes to two fractionating towers in series. Here separation into C-3 and C-5 cuts is made. The C-3 and C-4 cuts leave the first tower overhead to pass through a depropanizer which produces the C-3 cut overhead while the C-4 cut is taken off the bottom. The C-3 cut may be used for making isopropyl alcohol or split into propane and propylene, the former for use when liquefied as cutting gas and the latter

GEORGE H. METTAM

He officiated at ceremonies dedicating the eastern seaboard's first fluid catalytic cracking unit at the Bayway, N. J. refinery

for further processing into aviation gasoline. The C-5 cut taken off in the first fractionating step also includes aviation and motor-gasoline constituents.

The C-3 may be sent to another fractionating unit to obtain a pure cut which is then charged to an alkylation plant where it is combined with isobutane to produce aviation gasoline. The C-4 cut is normally sent directly to the alkylation unit or can be polymerized into codimer. Hydrogenated codimer is technically isooctane and, as such, is used to make some types of 100-octane aviation gasoline.

The C-5 and higher cut is charged to the second of the fractionating towers operating in series. This tower separates the charge into two fractions, one boiling from 300° to 400° F., and going to motor gasoline, and another boiling under 300° F. which constitutes aviation-gasoline base stock of 92-97 octane when 4 cc. of lead are added. This rating is raised by addition of alkylates or technical isooctane.

Temperatures-Pressures Low

As is apparent from data given, this process is a low-temperature, low-pressure operation. In addition there are no moving parts involved in the main reaction system. Fourteen miles of pipe from 4-in. to 6 ft. in diameter are used in it.

Butylene fractions for synthetic-rubber manufacture may be taken off after the first fractionation of the vapors from the cracking plant. These butylenes may be dehydrogenated into butadiene for buna-S or buna-N rubber while isobutylenes may be charged direct to the butyl plant for making butyl rubber.

George H. Mettam, manager of the company's New Jersey refineries, presided at the dedication ceremonies. Speakers included T. M. McMillan, chairman, Bayway Employes Association; Lt. Col. Charles E. Kerwood, Army Air Force, Washington; Lt. Douglass Gessford, of the Navy, who interviewed three sailors who had participated in the Santa Cruze Battle, and R. W. Gallagher, president of Standard Oil Co. (New Jersey).

Mr. Gallagher cited the unit, built for war, usable for peace, as visible evidence that instruments of good—for production, construction, and distribution—are coming out of this war, and said that they will make possible a revolution in living standards.

Other statements by Mr. Gallagher included: "100-octane gasoline will drive a standard car 40 miles to the gallon; our company is making 60 times as much as 2 years ago, far more than all requirements estimated as recently as 1941; in 1934, 1,000 gal. were sold to the Army for $2 per gallon, today it sells at 15 to 20 cents."

Women are playing an increasingly important part in operations of the oil industry. Symbolic of the trend are these two, Irma Wolf and Alicia Gustof, the first two women employes in Sun Oil Co.'s development division, Marcus Hook, Pa.

THIS WEEK

REFINING—First fluid catalytic cracking plant dedicated, performance features disclosed. . . . ¶Houdry reveals new development, adiabatic-catalytic cracking, to improve quality of aviation fuel. . . . ¶Butadiene conversion projects, Gillette committee told, will produce 156,800 tons annually, cost $51,000,000. . . . ¶Shell's Wood River plant awarded Army-Navy "E" for over-all contribution to war program. . . .

PRIORITIES—Director Jeffers assigned full authority to allocate rubber among claimant agencies. . . . ¶Transition to CMP may take longer than originally planned. . . . ¶Some think complete conversion will take a year. . . .

PRODUCTION—Texas buyers nominate more crude than PAW quota provides; Railroad Commission sticking to pledge—to observe federal certifications . . . ¶Coles Levee field, California, operators work out unit plan, production allocation restored. . . .

TRANSPORTATION—Gulf Coast refiners start shipping moderate amounts of kerosene, in drums and box cars, to East Coast—DSC agrees to pay extra costs. . . . ¶Tank-car shipments rise to 822,000 bbl. daily, up 72,000, brings goal of 900,000 in sight. . . . ¶Speedier turn around, symbol trains, cooperation of railroads and oil shippers given full credit. . . . ¶Oil moving north through WEP line, as pump stations are commissioned. Mississippi crossing about rebuilt. . . .

MARKETS—Products steady at unchanged levels. . . . Calls for fuel oil particularly brisk. . . . ¶Ceiling lifted on Wyoming residuals. . . . ¶OPA still wrestling with refinery-product price adjustment, to compensate for higher recovery of fuels. Observers say it's in the works, when it will emerge, anybody's guess. . . .

EXPLORATION—Texas revises new-discovery allowable, improving inducements for wildcat drilling. . . . ¶Illinois representatives seek assurance that M-68-5 will be continued. . . . ¶Disadvantages of trading steel for oil in Illinois, compared unfavorably with Texas, by Don Knowlton.

SUPPLIES—East Coast picture slightly improved, in local spots, but inherent shortage, or causes of deficiencies, remain. . . . ¶Deliveries of 212,000 bbl. by pipe lines, to East Coast, forecast by April 1. . . .

Houdry Announces New Catalytic Process

WASHINGTON, D. C. — Development of a new catalytic process which will produce increased quantities of high-octane aviation fuel was announced here January 18 by Eugene J. Houdry, president of the Houdry Process Corp.

Comprising an adiabatic-catalytic cracking method, the new Houdry process operates on heavy naphtha and yields an aviation fuel of higher octane equivalent than normally produced. Quality of the gasoline, the company asserted, is so high that it is ahead of currently developed engines. For the time being, therefore, its chief value will be to raise the octane rating of presently produced aviation fuels.

By utilizing heavy naphthas, the process will make possible increased production of aviation fuel without increasing the need for crude-oil production or placing a further drain on crude-oil transportation facilities.

Refineries embodying this process, because of its adiabatic-catalytic feature, will be simpler to construct and units will require smaller amounts of critical material, the company claims. Consequently, both the time required for building and the cost of construction of plants will be reduced.

This Houdry adiabatic - catalytic cracker was designed to meet demands for increased quantity and quality of aviation fuel. The process will achieve this goal in quicker time and with less drain on natural resources, transportation facilities and critical materials, Mr. Houdry declared.

The Houdry adiabatic process was developed early last year in the search for an economical method for making butadiene, main ingredient of buna-S synthetic rubber. The principle was tested in a semicommercial butadiene plant built several months ago by the Sun Oil Co. This was the first plant to be completed demonstrating the feasibility of producing butadiene by a catalytic process on a reasonably large scale.

Houdry - technicians have since turned their attention to adapting this adiabatic principle to the production of aviation fuel by catalytic cracking. They first developed the process on a pilot-plant scale. Engineering and construction of commercial units are now under way.

The enemy of all catalytic processes for cracking oils and gases is carbon. Houdry scientists developed the technique for turning this troublesome factor into an advantage. This method converts the carbon deposit on the catalyst into heat necessary to rearrange the hydrocarbon molecules into the desired product without the use of materials for equipment to handle extraneous heat exchange.

Catalytic cracking of oil for aviation and automobile fuel was commercially developed by Houdry after 14 years of experimentation and was the first catalytic cracking process to be used. The first commercial Houdry catalytic cracker went into operation in 1936.

During the past year 16 Houdry catalytic crackers, operated by four major oil companies, produced better than 90 per cent of all the catalytically cracked aviation-base stock produced in this country. Eleven more Houdry catalytic cracking units now are under construction and as rapidly as possible will take their place as sources of supply for aviation fuel for the flying forces. In adnine Thermofor catalytic crackers are being rushed to completion.

During the last year work also has been done, in cooperation with the engineers of Socony-Vacuum Oil Co., Inc., in adapting the Houdry process to the production of ethyl benzene and on the dehydrogenation of ethyl benzene to styrene, the other important ingredient of buna-S rubber.

Contractors Ask Relief From Double-Time Wage Order

WASHINGTON, D. C.—The American Association of Oilwell Drilling Contractors appealed at a public hearing January 19 against application to them of president's Executive Order 9240 issued September 9, 1942, requiring that double time be paid for the seventh consecutive day on all work relating to the prosecution of the war.

Hearing was before an assistant solicitor of the Department of Labor who will make recommendations to the secretary for final decision. Drillers were represented by their attorney, H. F. Thompson, who argued that drilling 7 days a week is not emergency work but is the usual practice.

Another objection presented by Mr. Thompson was that drillers are not engaged in "work relating to the prosecution of the war" as their contracts are made with the oil companies and not with the Government. If this principle were applied, Mr. Thompson said, "makers of drilling machinery would also have to be included in the order."

The change to payment of double time would leave the drillers three choices. They would either have to hire more men, shift the hours, or pay the overtime. The first two are impractical, according to drillers present, because of the manpower shortage and the nature of the operations.

Sen. Lee O'Daniel, of Texas, present at the hearing, said that the refusal of the Government to grant a price rise in oil, added to the upward pressure of wages brought on by the Fair Labor Standards Act," squeezes the oil men out of business."

Representatives Russell, Mahon, Gossett and Beckworth, all of Texas, added their voices to the hearing, asking that an exception be made "so that the drillers will not have additional problems heaped upon them in the emergency."

D. R. Knowlton, director of production of the Petroleum Administration for War, cited figures showing the urgency of our oil needs, and the need for more wildcat exploratory wells being drilled. He said that last year we had opened only 3,000 wells, when the desired figure was 4,500. Mr. Knowlton took no position on the issue, but merely attempted to show the importance of the industry to the war effort.

Others present at the hearings were: Dale Miller, Washington representative of the Dallas, Tex., Chamber of Commerce; J. E. Brantly of the Drilling & Exploration Co., Los Angeles, Calif.; George P. Livermore, G. P. Livermore Co., Lubbock, Tex.; W. H. Wheeless, W. H. Wheeless Drilling Co., Shreveport, La.; William D. McBee, M. J. Delaney Co. of Dallas; Brad Mills, executive secretary of the association; G. R. Whitney, Chemical Process Co., Breckenridge, Tex.; Lawrence E. Smith, Independent Petroleum Association of America, Washington, D. C.; John P. Moran, Moran Brothers Co., Wichita Falls, Tex.; W. J. Lewis, drilling contractor of Mount Vernon, Ill., and A. H. Rowan, Rowan Drilling Co., Fort Worth, Tex.

Oil Deficiencies Discussed At Texas Hearing

DALLAS, Tex.—The possibility that the nation's oil fields might not be able to supply the wartime petroleum demand which is scheduled to rise steeply during the middle of 1943 was the principal concern of those attending the state-wide hearing of the Texas Railroad Commission in Dallas January 15. It was also indicated that the cooperation which Petroleum Administrator Ickes is receiving is a hedge against the day when conservation will have to be abandoned and all and sundry will scream, "I told you so."

The meeting, held principally to receive nominations from purchasers on crude requirements during February, went into a variety of subjects, the principal ones being the needed increase in the nation's oil reserves and the methods of meeting war requirements. Failing to get through federal agencies any relief from the situation which has drastically curtailed exploratory wells, the commission amended its own rules to increase substantially the allowables granted pool openers as a means of encouraging wildcatters.

February Quota Raised

The PAW February quota for Texas was announced as being 1,452,000 bbl. daily for all crudes as against the nominations by purchasers of 1,600,000 bbl. The fact that the federal allowable is up 25,200 bbl. over January was indicative to those at the meeting that further increases would be forthcoming as the year progressed.

The potential crude-oil shortage came up several times during the meeting. Recently the railroad commissioners had asked producers for their estimates of the productive possibilities of the individual fields in the state. These reports have been coming in and while the commission did not announce the survey results it was evident that it was not encouraging for the long-term supply picture.

The new order applicable to discoveries was read by Commissioner Olin Culberson at the request of Chairman Beauford Jester. The order grants a new-pool discovery a daily allowable according to the accompanying table for a period of 18 months after the first marketing of the oil without any shut down days. Each well drilled in such a new field shall receive the special allowable exempt from shut down days, for a period of 18 months, or until there shall have been six producing wells completed, each of which is a location at least ½ mile from any other producing well. The order is retroactive to all discoveries which have not yet marketed oil.

TABLE 1

Discovery Allowable Per Day in Texas

Depth of well, ft.	Daily allowable, bbl.
0 to 1,000	20
1,000 to 2,000	40
2,000 to 3,000	60
3,000 to 4,000	80
4,000 to 5,000	100
5,000 to 6,000	120
6,000 to 7,000	140
7,000 to 8,000	160
8,000 to 9,000	180
9,000 to 10,000	200
10,000 to 11,000	220
11,000 to 12,000	240

TABLE 2

Commission's Report on Texas Stocks

Storage capacity at refineries	125,561,000
Oil and products	71,747,000
B.s. and w.	257,000
Total stocks	72,004,000
Available storage	53,557,000
Pipe-line and terminal capacity	142,933,000
Oil and products	73,157,000
B.s. and w.	4,609,000
Total stocks	77,760,000
Available storage	65,167,000
Total available storage	118,724,000

In addition to encouraging wildcatting and sufficient development of newly discovered pools to properly evaluate the reserves involved, the new order permits the operators in a new pool to develop acreage without necessarily ending the new field allowable which would deprive the discoverer of his bonus oil. It also eliminates the drilling of five wells in a cluster around the discovery and then postponing further development for a year, a bad feature under the old rule.

The provision allowing wells in new fields ½ mile or more from the nearest producing well to share in the special allowable would not result in the addition of a great number of wells since the size of the average field discovered in Texas during the past 2 years was approximately 600 acres. The ½-mile extension provision is designed solely to encourage speedy delineation of new fields so that if any sizable discovery is made, its importance may be known promptly.

Mr. Culberson urged pipe lines to make every effort to supply an outlet for the discoveries because if an outlet is not available, "the wildcatter is in the same or worse condition than he was before he made the venture. Let's all see," he concluded, "if we really mean what we say about being willing to do whatever we can to assure an adequate petroleum supply for the war effort."

Small East Texas Operators Benefit

East Texas, which has occupied a prominent place at the last several state-wide hearings was not the bone of contention as usual although the commission did amend its field runs to grant a bonus of 1 bbl. of oil for each 50 bbl. of water injected into the Woodbine sand, regardless of who does the injecting. The bottom-hole pressure in the field declined 1.41 lb. per sq. in. during December to 1,015.71 on January 1, a drop of 0.125 lb. per 1,000,000 bbl. of oil produced, according to a commission announcement. Daily average production during the period was 362,544 bbl.

One East Texas operator brought up the subject of allowable transfers as a means of shutting in salt water. He requested its consideration as a means of preventing water production which would be preferable to granting bonus oil for reinjection. H. P. Nichols, Tyler, Tex., requested one additional producing day in East Texas and suggested that the commission take up the matter of increased inventories, which he considered perilously low, with federal authorities in Washington.

A number of requests for higher allowables were received and finally Col. E. O. Thompson, member of the commission, pointed out that the allowable for the state was set by Washington and that the commission was going to meet the quota "on the button." He asked a representative of a company seeking more oil, "Would you have us go above the federal allowable to grant your request?" The representative replied: "Yes, certainly."

(Continued on Page 14)

1942 INDEX READY SOON

The complete editorial index of The Oil and Gas Journal for 1942 will be off the presses this month but, deviating from previous custom, it will not be incorporated in a regular issue. The 1942 index, bound separately, will be sent without charge to all subscribers requesting a copy. Address requests to Circulation Department, P.O. Box 1260, Tulsa.

WE THANK YOU-

We expected that our readers would be pleased with the changes that were inaugurated in the size and typography of the Journal with the first issue of the New Year. But we were not entirely prepared for the hundreds of congratulatory comments received by our representatives in all parts of the country, and also by the home office in the form of letters, typical specimens of which are here presented, following those published last week. We are grateful that the changes have found such enthusiastic favor, and we promise continued improvement in dress and content in the weeks to come.

PURE OIL CO.

I received day before yesterday a copy of The Oil and Gas Journal in its new form. It occurs to me that you are probably wondering how it will be received by your subscribers, and I want to express my opinion that it is a very great improvement. The only criticism I have ever heard of The Oil and Gas Journal was because of its too great bulk, and I have often wondered if it were entirely necessary. I think you are all to be most heartily congratulated.

HENRY M. DAWES,
President

I like very much the new size of The Oil and Gas Journal. I do not believe you are sacrificing anything at all. In fact I believe you will find that your readers will be very much pleased, as it is easier to handle, requires less space to file, and in my judgment presents a more attractive and dignified appearance.

ALVIN RICHARDS,
Attorney

You are to be congratulated on the new form of The Oil and Gas Journal. I have been a consistent reader for many years, but must confess that the previous large size was somewhat unwieldy to handle. believe that this viewpoint will be that of a very substantial percentage of your subscribers..

L. S. WESCOAT,
Vice President and Secretary

UNIVERSITY OF KANSAS

It takes real courage to depart from long years of tradition and embark on a new adventure. The step which has been taken by The Oil and Gas Journal in its change of style is most welcome. It is convenient for filing, for reading and will continue to supply us with up-to-the-minute oil and gas news.

EUGENE A. STEPHENSON,
Head of Dept. of Pet. Engr.

SKELLY OIL CO.

After reading the recent issue of the Journal on the new format, I can sincerely say that I like it much better than the old size. It is much more convenient to hold while reading, and it can be much more readily carried in one's bag or brief case in the event—as I often do—one wishes to read it or refer to it while traveling. Incidentally, I have heard at least two dozen people express their opinion, and they have all been favorable.

H. H. STALCUP,
Vice President, Prod. Dept.

STANDARD OIL CO. (NEW JERSEY)

I want to include a word of praise for your new format. It makes for much easier handling of your magazine.

R. W. GALLAGHER,
President

Permit me to congratulate you on the Journal's new format. It seems to me to be a striking improvement. I suppose this change is prompted, in part at least, by shortage of strategic materials. I suppose, also, there is some disadvantage in that the new page size does not permit reproduction of text figures and illustrations on as large a scale as the old page permitted, but in appearance and in manipulation of handling and filing the new issue should be welcomed.

WALLACE E. PRATT,
Vice President

WELL EQUIPMENT MFG. CORP.

I find the new format highly pleasing and attractive. The reduction of its size to standard measurements will facilitate our use of the magazine in many ways. Besides being a conservation of paper, in its compact form it can find a more permanent place on a businessman's desk. It can be handled with considerably more reading comfort; and, more important, it can now be filed away for reference along with other material of a similar nature in a standard-size file. In short, its usefulness and value have been much increased, and I congratulate you on the foresight that prompted you to make the change.

C. K. STILLWAGON,
President

SOCONY-VACUUM OIL CO., INC.

I believe that the new Oil and Gas Journal is an improvement over the old one, particularly with reference to the size, which is much more suitable for binding.

J. B. RATHER,
Charge of Research and Development

SOHIO PIPE LINE CO.

Although I have not had time to evaluate all of the changes you have made in the Journal, my general impression is very good, and I must say that I like the smaller size better because it is so much more convenient to carry around and it fits the ordinary shelf space better than the old size.

S. H. ELLIOTT,
Vice President

E. T. WILLIAMS OIL CO.

I think it is a great improvement and I know it will meet with general approval. The January 7 issue is even more interesting, if possible, than some of the previous issues.

E. J. SULLIVAN,
President

ARTHUR G. McKEE & CO.

Your January 7 issue just arrived and I hasten to congratulate you on

its appearance. I believe that everyone will appreciate the new size and form that you have adopted.

M. R. WALTON,

DONALD B. COLLINS

The new size of the publication is handier and, I believe, more usable, especially for people who find it necessary to carry it in a brief case.

DONALD B. COLLINS

INTERNATIONAL PETROLEUM CO., LTD.

In my opinion the new standard size is a decided improvement and I believe the industry as a whole will welcome the change. We are sometimes loathe to deviate from customs acquired over a period of years but I do feel this change, which evidences that the Journal is being kept up-to-date and still the leader of its class, will prove beneficial. With bifocal glasses I find it is not necessary to shift the new size Journal or move my head as I had to with the former size, and think it is much more convenient to read.

B. A. MYERS,
Vice President

R. O. ROY & CO.

Congratulations on changing the size of your Journal so that it now can be filed in a regular letter filing cabinet, or stacked up on the desk or carried around in a brief case with correspondence and other letterhead size papers.

R. O. ROY,
President

FIRST NATIONAL BANK IN DALLAS

Please let me join the host of your friends and readers who, I know, will extend congratulations on the new size of your magazine. It is much more compact and thus more convenient to handle and read. As a matter of fact, I think the entire magazine is much more attractive in every way and the change surely will be welcomed by all of your readers.

EUGENE McELVANEY,
Vice President

RAY K. GLENN

I want to compliment you on the appearance of the new size Oil and Gas Journal.

From the standpoint of readability and reproduction of halftones, I believe there has been a tremendous improvement. I especially like the new type faces used in heads and text.

T. A. WORKMAN

CITIES SERVICE OIL CO.

In reference to the new standard size of The Oil and Gas Journal, I wish to advise that I prefer it to the larger size.

A. W. AMBROSE,
Executive Vice President

I remember in the old days as a youngster, when working in the oil fields of California, I occasionally saw a copy of The Oil and Gas Journal. As time went on and particularly from the time that I moved to Oklahoma and subsequent to that time, the thorough reading of the Journal became a combination chore and pleasure. So, through the years, I became accustomed, whether in my office or on a trip, to look for the big, yellow Journal. When it was first announced that you were going to reduce the size of the magazine, I became apprehensive lest it would lose its old charm.

The above is all background.

I like the reduced size. It is much more convenient to handle and conforms to what is now pretty well standard in trade journal and magazine form. My apprehension in regard to this change was unfounded.

WARREN A. SINSHEIMER,

ENVOY PETROLEUM CO.

The new-sized Journal is an improvement over the larger, harder-to-handle, difficult-to-file-away larger size formerly used.

A. M. LOCKHART,
President

OIL WELL SUPPLY CO.

My congratulations to you on finally "coming around" to the standard-size publication. I cannot imagine a dissenting vote from your public, and I am sure the change will be another element conducive to your continued success.

FREDERICK F. MURRAY,
Vice President

STANDARD OIL CO. OF LOUISIANA

It is my opinion that the new size is a great improvement over the original and have no doubt but what it is more convenient to handle and the subscribers and others will peruse it more thoroughly. It will also be more convenient for filing issues for future reference.

S. W. DAY,
Vice President and General Manager, Pipe-Line Department

TIDE WATER ASSOCIATED OIL CO.

It is indeed an improvement and I think it is a most convenient size. I congratulate you and your organization on adopting what will be the most practical and useful size of technical magazine in the future.

C. R. BARTON,
Vice President in Charge of Mfg.

CONSOLIDATED OIL CORP.

I have just received the January 7 issue of The Oil and Gas Journal, the first I have seen in the new form. I congratulate you on its makeup and its very neat and compact appearance. I am sure that the contents will continue to be up to your superlatively high standard.

H. L. PHILLIPS,
Vice President

***NEXT WEEK*--OUTLOOK AND REVIEW NUMBER**

Including this partial list of features:

- **Colored maps showing locations of all important discoveries.**
- **Accompanying tables giving the pertinent data on new fields.**
- **An up-to-the-minute inventory of the industry's crude-oil reserves, last year's changes, the 1943 requirements and prospects for meeting them.**
- **Demand—what it was, what it will be.**
- **All major changes in pipe-line transportation will be mapped. Each of the emergency projects brought up to date.**
- **Chronological highlights of Washington developments in each branch of the industry.**
- **Drilling reviews by areas, plus the detailed production data.**
- **What refiners face in adjustment of operations. The outlook for materials.**
- **How the war has revamped manufacturing.**
- **Influence of price ceilings, what current policies indicate for the near future, their relation to other operations.**

State Capitals

KANSAS

PRODUCTION QUOTAS for fields and wells in Kansas for February will be determined on the basis of testimony presented at Wichita January 26 before the Corporation Commission. The Petroleum Administration for War is expected to have February certified-production schedules issued for the various oil states before the hearing convenes.

Purchasers of Kansas crude have been notified to advise the commission of their oil requirements for February on or before the hearing date.

CALIFORNIA

OPERATORS in the Coles Levee field of Kern County, California, this week signed an agreement which provides for unitization of production operations. The Conservation Committee of California Oil Producers refused to give the Coles Levee field an allotment for January and in doing so forced operators in this field to suspend production on January 1, 1943. Operators in this field were warned last December that the field would not be given an allotment for January unless a unit plan of operation or some other acceptable method was adopted to reduce gas production.

The Coles Levee field contains a gas cap and it was the production from this area that was objectionable to the conservation committee. Wells in this section of the field produced under excessive gas-oil ratios and it was this condition that the conservation committee opposed even though all gas was taken into natural-gas transmission lines and used in domestic and commercial service. The committee considered the production of high gas-oil ratio wells as constituting underground waste and production in excess of the maximum efficient rate which has been the dominating influence in California production practice for the past several months.

At a meeting of the conservation committee this week, the group reestablished the field's allotment of 3,100 bbl. per day and a small additional amount to permit operators in the gas cap area to make a series of tests. Allowable was restored to the field after operators informed the committee that an agreement had been reached and would be put into operation at the earliest possible moment. The agreement, pending installation of a repressuring unit, provides that all of the field's January allotment would be produced in the so-called black-oil area with the exception of 25,000 bbl. that might be produced in the gas cap zone during the series of tests which have been authorized. The controversy involving the Coles Levee field was a complex one and operators had considerable trouble agreeing on a plan that would be equitable to operators and agreeable to the conservation committee as well as to PAW. Operators producing from the gas cap area were at a distinct disadvantage while those producing black oil around the edges of the structure were in an advantageous position.

ILLINOIS

CONTINUED AND GREATER oil development in southern Illinois, and the tristate area, was the plea of six Illinois congressmen who called upon Don Knowlton, PAW director of production, in Washington last week.

This committee, fearful that the petroleum administrator might not continue the modification of M-68-5 further than the now set date of January 31, 1943, made an urgent plea that the present order be continued indefinitely and in addition that it be modified providing that one well to 20 acres might be drilled in the McClosky lime whereas the present order restricts such drilling to one well to 40 acres.

They urged the fact that the Government was in dire need of oil production for the eastern seaboard and for export to the armed forces in North Africa and to England, that due to the relatively close proximity of the Illinois fields to the eastern seaboard compared to the long haul from the Southwest that oil exploration and production should be stimulated rather than curtailed in the Illinois-Indiana area.

Mr. Knowlton expressed a keen desire for greater exploration and greater production of oil, admitting the serious need at present which will grow greater in the future. However, he told the committee that his very difficult and serious job "was trading steel for oil." He discussed the increased Illinois production due to the modification of M-68 since the ruling was put into effect August 31, 1942. He offered figures to show that this modification had resulted in the drilling of 225 additional wells in the Illinois area, the production of which increased the Illinois output by 10,400 bbl. a day. He estimates that the increase due to Order M-68-5 will carry through for the year 1943 a daily increase of about 12,000 bbl. a day.

Mr. Knowlton pointed out, however, that the drilling of these 225 wells required the use of 11,250 tons of steel which showed a ratio of 4 lb. of steel used to the production of 1 bbl. of oil. He stated this was a very high percentage of steel to oil production, that in the heavier production in the southwest the poundage ratio ran down to 1 lb. and less to the barrel of oil.

Oil Deficiencies Discussed At Texas Hearing

(Continued from Page 11)

Paul McDermott, representing Sinclair Prairie Oil Marketing Co., in requesting more oil pointed out that his company was getting 37,000 bbl. in East Texas, 6,267 bbl. in the lower Gulf Coast, and 21,304 bbl. from Districts 7-B and 9 for a total of 64,718 bbl. Of this amount, 30,000 bbl. went to the Gulf Coast which left a balance of 34,718 bbl. for shipment northward to Chicago. This line has a capacity of 53,000 bbl. which leaves it 18,000 bbl. short of capacity. Mr. McDermott said spot purchases in East Texas permitted his company to acquire 8,500 bbl. of oil and 9,700 bbl. were withdrawn from storage.

Complexity of the Texas storage situation was discussed and it was indicated that finished products were crowding out crude oil; also that the commission's figures did not reveal the true picture.

Rex T. Baker and J. N. Neath of Humble Oil & Refining Co., submitted a report explaining figures filed monthly with the commission. They pointed out that all the capacity listed at refineries and terminals could not be used as 60 per cent leeway was needed owing to tanks being employed for specific purposes, not being interconnected, or being isolated. In Southwest Texas there are 3,200,000 bbl. of the Mirando type crude in storage and by February 1 there will be less than 300,000 bbl. storage available. As a result runs by the Humble company in the area had been reduced to 46 per cent. Product storage at the Humble refinery has become congested and operations had to be reduced from 30,000 to 8,000 bbl. daily for a time. Lack of tankers on the coast also poses a problem and causes oil to pile up at the wrong places, according to the Humble representatives.

the OIL AND GAS JOURNAL

PRODUCTION - TRANSPORTATION
REFINING - NATURAL GASOLINE

Founded in 1910 by
PATRICK C. BOYLE

Economists Appraise "Big Inch"

THE 24-in. line extending from East Texas through the Middle West to the Atlantic Seaboard is many things to many people.

To the enemy it is the proverbial pain in the neck and worse—something he hadn't thought about in his prewar planning.

To the inhabitants along the line, away from the oil country, it is a "believe it or not". They and millions more look to it as an aid in relieving the severe rationing of gasoline and fuel oil.

To the engineers who designed it and to the contractors, it is a major accomplishment made possible because through the years they had learned, with smaller lines, what to do.

And now the economists within and outside the petroleum industry are making their appraisals and many are coming to the conclusion that in the postwar economy the "big inch" will rank with the most important war developments.

There has been a steady expansion in pipe lines in this country starting from the time the first short line took away part of the teamsters' business shortly after the Drake well was brought in. Over the past 12 years a rapidly expanding network of product lines has been built.

In recent years there are those who visualize a vast system of gathering, trunk and distributing lines which would collect the crude in the fields, transport it to refineries, and deliver it as finished products to the smaller towns and cities as well as the large centers of demand.

The economics in this program is generally sound. There are savings in transportation costs which would justify the capital outlays with the areas of feasible application expanding as volume increases and operating charges are reduced.

But in all these calculations it has been assumed that ocean-going tanker transportation was a stop on what could be done with pipe lines. The objective of transporters has always been to get their crude oil or products to the oceans as quickly as possible and there take advantage of what has been the industry's cheapest transportation method. Its importance is indicated by the fact that up until our entry in this war more than 40 per cent of the petroleum consumed in this country was transported most of the distance between fields and bulk stations by ocean tankers.

Now it is apparent that the 24-in. artery is more than a war emergency and will be able to operate competitively with the industry's cheapest means of transporting liquid petroleum over long distances. It is the pioneer which will bring revisions in existing pipe-line operations. It will eliminate coastwise transportation as an essential factor in working out a plan of moving large quantities of crude oil and products over long distances connecting oil areas wherever they are found to the population and industrial centers.

Regarding permanent defenses, in the light of what has happened over the past year, no one will challenge the statement that this nation's petroleum arteries wherever possible should be underground.

So the oil business has a new and permanent tool—the gift of those who build and operate and those who manufacture materials and equipment. It is another accomplishment of a free industry always seeking through research and practical endeavor to strengthen its position through lower costs and better service to customers.

Nation's Gasoline Use Declines 12 Per Cent

DOMESTIC gasoline consumption in the United States in October of last year was 12.13 per cent less than in October 1941 according to the latest compilation of the American Petroleum Institute. The October report as explained by the Institute is "based upon returns made in accordance with the provisions of the various state gasoline-tax or inspection laws and reflect as nearly as it has been possible for us to obtain it, the total consumption of gasoline, whether taxable, subject to refund, or not." This means that the information includes much of the military as well as the civilian consumption of gasoline in this country.

As shown in the accompanying table the decline in gasoline consumption in the 17 eastern and southeastern states and the District of Columbia where enforced rationing was generally effective in October was 26.2 per cent with all states suffering decreases. Georgia with a decline of only 2.4 per cent was least effected.

In the remaining states where gasoline rationing in October was on a voluntary basis the decline compared to the same month in 1941 was only 4.1 per cent with consumption in eight states exceeding October 1941. The increases usually are accounted for by the large requirements of Army and Navy training camps or the enlarged needs of agricultural areas.

Rationed Area

(Thousands of gallons)

	Oct. 1942	Oct. 1941	Per cent dec.
Connecticut	27,218	36,838	26.1
Delaware	4,113	5,875	30.0
Dist. of Columbia	11,949	16,485	27.5
Florida	36,764	37,689	2.4
Georgia	28,045	39,460	28.9
Maine	11,495	15,869	27.6
Maryland	26,613	32,730	18.7
Massachusetts	48,222	69,179	30.3
New Hampshire	5,588	9,018	38.0
New Jersey	65,168	89,311	27.0
New York	130,189	181,113	28.1
North Carolina	34,204	47,827	28.5
Pennsylvania	113,357	151,761	25.3
Rhode Island	9,822	12,398	20.8
South Carolina	16,305	23,974	32.0
Vermont	4,507	6,821	33.9
Virginia	31,758	44,189	28.1
West Virginia	16,188	21,211	23.7
Total	621,505	841,748	26.2

Nonrationed Area

(Thousands of gallons)

	Oct. 1942	Oct. 1941	Per cent dec.
Alabama	26,660	30,900	13.7
Arizona	11,304	11,382	0.7
Arkansas	18,016	21,420	15.9
California	232,949	191,639	*21.6
Idaho	10,196	11,092	8.1
Illinois	123,089	140,765	12.6
Indiana	67,165	73,130	8.2
Iowa	46,604	53,875	13.5
Kansas	36,703	39,600	7.3
Kentucky	24,943	30,084	17.1
Louisiana	23,865	32,084	25.6
Michigan	103,201	120,993	14.7
Minnesota	48,087	53,534	10.2
Mississippi	24,418	23,767	*2.7
Missouri	55,373	65,512	15.5
Montana	11,458	12,621	9.2
Nebraska	23,390	22,439	*4.2
Nevada	4,962	4,478	*10.8
New Mexico	8,449	9,160	7.8
North Dakota	19,539	15,113	*29.3
Ohio	127,881	143,848	11.1
Oklahoma	34,206	36,311	5.8
Oregon	24,404	27,794	12.2
South Dakota	14,007	12,861	*8.9
Tennessee	31,294	35,858	12.7
Texas	155,382	142,057	*9.4
Utah	10,762	10,593	*1.6
Washington	39,623	39,352	*0.7
Wisconsin	51,411	57,047	9.9
Wyoming	5,801	6,712	13.6
Total	1,415,144	1,476,021	4.1

*Increase.

Railroads Boost Oil Traffic to Recent High

WASHINGTON, D. C. — The achievement of the railroads in dispatching a daily average of 822,000 bbl. of petroleum to the East Coast for the week ended January 8 in the dead of winter brings the current goal of 900,000 bbl. a day "in sight" and provides new hope that the goal will be reached soon, Joseph B. Eastman, director of the Office of Defense Transportation, asserted.

The week's shipments were 72,000 bbl. a day above the 750,000-bbl. average of previous weeks, but somewhat below the all-time high of 856,710 bbl. a day loaded in tank cars for the East during the week ending September 19.

Tubeless Tire Affords Little Relief in Current Emergency

WASHINGTON, D. C.—The tubeless tire apparently does not offer much help for the present rubber emergency, but the principle seems feasible and practical for the future, the transportation committee of the Petroleum Industry War Council reported last week after a month's operating road tests by oil companies on more than 1,000 tires in all parts of the country.

William R. Boyd, Jr., council chairman, announced that the committee believes the idea "has large potentialities for rubber conservation," and the proponents, James B. McGay and V. F. Barnett, of Tulsa, "have made a real contribution to the future conservation of rubber."

The tests, conducted by oil companies under the direction of the committee, of which W. Alton Jones, president of the Cities Service Co., New York, is chairman, were reported to be inconclusive, however, because of the short time, insufficient mileage, and narrowing of the conditions under rationing and low speeds.

They did disclose that most of the new tires and tires in A-1 condition were operated successfully without tubes, but older and poorer tires used failed in many of the tests. The committee quotes the latest opinion of the original proponents, that the successful adoption will require the use of a permanent seal on the inside of the tire to prevent air from working through the fabric.

Test variables are tabulated for 746 tires in the report, but the committee said that data for 307 additional tires, which were received too late for inclusion, confirm the findings tabulated. The tires ran up a total of more than 450,000 tire-miles on 235 cars and light trucks.

Omitting the tubeless spares, which the committee found could not be kept inflated without tubes, and a few tires for which insufficient data were reported, a total of 619 original tires and 55 recaps are included in the summary tables. Of the original tires, 404 were in good condition, 131 average, and 84 poor, when the tests started. Of the recaps, 34 were good, 15 average, and 6 poor.

Altogether, 166 of these either failed or ended the test with such poor records that they could be classed as failures, for an over-all failure of 25 per cent. Less than 20 per cent of the good tires failed, while 30 per cent of the average ones, and 40 per cent of the poor ones, completed the tests unsatisfactorily. Few of the tires actually blew out or were damaged beyond repair; most of the failures were from excessive loss of pressure.

Shell's Wood River Plant Is Awarded Army-Navy "E"

by J. P. O'Donnell

WOOD RIVER, Ill.—The first oil refinery in the country to receive the Army-Navy "E" award—the Wood River refinery of the Shell Oil Co., Inc.—was presented with the honor before a gathering of several hundred employes and officials at Wood River, January 15. In bestowing the honor, Col. Merle H. Davis, district chief of the St. Louis ordnance district, cited Shell as the "first to supply Army and Navy aircraft with 100-octane gasoline."

ALEXANDER FRASER

President, Shell Oil Co., Inc., who spoke at the presentation ceremonies

Colonel Davis complimented the oil industry in general and Shell in particular when he said: "You have contributed to all three," referring to the tools with which to fight the enemy, ships, aircraft and ordnance. "The Shell company," Colonel Davis said, "was the first to supply Army and Navy aircraft with 100-octane gasoline and the toluene from this refinery just goes across the river to the Army Ordnance plant to make TNT used by both the Army and the Navy. These three may be considered direct contributions to the fighting forces.

"I understand," said Colonel Davis, "that one of the items that struck the award board in consideration of whether or not a particular refinery of the Shell company should receive the Army-Navy "E" was the fact that it is a policy of the company, probably little known to the country at large, that when a Shell worker goes into the Army or Navy his dependents receive 50 per cent of his regular salary at Shell while he is in active service."

In conclusion Colonel Davis said: "You may have heard of many awards of the Army and Navy "E." The award still has been made to only about 1 per cent of the industrial plants doing war work. You are joining therefore a real aristocracy of war production."

Robert C. Roberts, manager of the Wood River refinery, accepted the award on behalf of the management. Comdr. W. F. Veatch, commandant, Sixth Naval Area, presented the award pin to Raymond H. Sanders, who received it as a representative of the employes.

Alexander Fraser, president of Shell Oil Co., Inc., noted the fact that the presentation was made on the twenty-fifth anniversary of the refinery which now has approximately six times the capacity of the original unit.

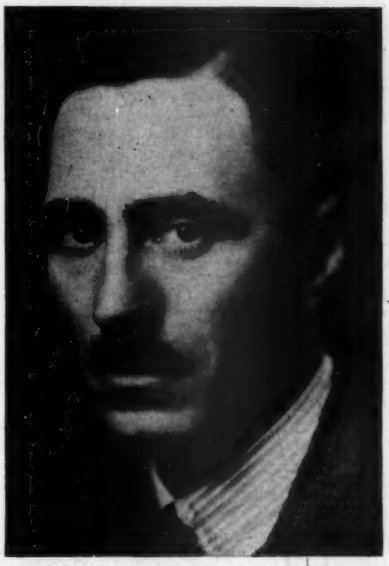
Fraser Comments on Award

"This award," he said, "is a tribute to the important role which you men and women have played in the war effort as well as to the technical research behind you which has made possible the production of vast quantities of vital war materials. It is this persistent, ceaseless search for new products from petroleum, as well as the constant improvement in the quality of existing products, which contributed so much to the progress of our industry in recent years. And it would be remiss of me not to call attention to the fact that technical research and the benefits which flow from it constitute our best guarantee of continued employment after the war."

Mrs. James H. Doolittle, wife of Major General Doolittle, former Shell executive and an important figure in Shell's 100-octane development, now with the U. S. Army Air Force in Africa, also spoke. She pointed out that both her husband and elder son are with the Army Air Force, both of whom recognize "how very important are the supplies that come from our production line."

Thomas N. Dysart, president of the St. Louis Chamber of Commerce, acted as master of ceremonies. He read communications from Major General Doolittle who sent congratulations to his former associates for earning the "Distinguished Service Cross of the production soldier." Harold L. Ickes, petroleum administrator for war, also wired his congratulations.

Shell executives present in addition to Mr. Fraser and Mr. Roberts were F. A. C. Guepin, executive vice president; J. W. Watson, treasurer; J. F. M. Taylor, vice president in charge of manufacture; R. B. Roark, vice president in charge of the Mid-Continent production area; C. E. Davis, manager of the manufacturing department; P. H. Swinchatt, vice president of the Shell Pipe Line Corp.; B. H. Symon, manager of lubricating sales; E. G. Robinson, manager of the eastern production area; G. G. Biggar, manager of public relations; L. A. Lohman, industrial relations representative; R. B. High, manager of the Washington office; H. Swanson, division manager at Chicago; J. G. Sinclair, division manager at Indianapolis; Horace Dale, assistant manager of the Wood River refinery; H. F. Brown, sales promotion advertising representative, and J. Ebel, editor, Shell News.



J. F. M. TAYLOR

Vice president, Shell Oil Co., Inc., in charge of manufacturing operations

Refinery workers were represented by committees of the Operating Engineers and of the Metal Trades. Representatives were A. H. Magill, member of the executive committee; Percy Lauck, secretary, and Ira Killan, for the operators; and Raymond H. Sanders, president; R. L. Turner, secretary; A. J. Gurley, M. A. Payne and Archie Preston, of the metal workers.

WHAT INDUSTRY THINKS ABOUT CURRENT ISSUES

This is another Journal survey of opinions on pertinent operating problems of the industry. Seventy-five per cent of the respondents believe a crude advance of 44 cents (average) is one requisite to averting an oil shortage within 2 years.

THE OIL AND GAS JOURNAL asked a large number of men in the technical and managerial ranks of the oil industry two series of questions dealing with the foremost problems of the day, namely the oil-industry manpower problem and the drilling program necessary to meet 1943's demand for crude. The questions and the proportion of answers to the various questions are recorded in the accompanying tables.

Because many persons answering the questionaire checked more than one item under each question, all of the checks recorded for each question were added together to provide the percentages in the first column. For the percentages in the second column, 100 per cent represents the total number of replies received and the excess of the percentages recorded represents the number of checks placed against that particular question. For example, in the second manpower question, the average reply contained just under two checks indicating that the average man thought that there were shortages in more than one category of oil worker. In answer to the second portion of the drilling-program question, the average man replying thought that nearly three steps would have to be taken to remedy the situation.

Views on Manpower

With regard to the existing manpower situation, the average is on the optimistic side of "serious." There was a general feeling that the situation would get worse and many who placed their checks before "serious" qualified their vote by a statement that things were not too bad now but would soon be more than merely serious.

Despite the nature of the employment group questioned, it is surprising that nearly 60 per cent thought that the shortage was in the categories of skilled and semiskilled labor. The shortage of technical men was not so noteworthy. There is apparently not much concern about office help, probably because of the possibility of replacement of clerical workers by women. The inconspicuous shortage of managers and executives is probably owing to the higher age brackets in which this group falls.

In addition to the questions presented on this page, recipients of the questionnaire were asked for suggestions as to the way in which the situation could be improved. The large majority of those answering thought that total deferment for oil workers would settle the labor shortage. Others pointed out that with the release of men above 38 years of age from the Army much of the present shortage should be relieved.

A second large group considered the relation of the oil industry to others. That high wages paid in war industries are draining men from the oil industry which, because of the low price of crude, cannot compete, was the opinion of many. Freezing men to their jobs was recommended by others while still others want the work week extended. This would, in the opinion of many, add to the productiveness of the workers and at the same time reduce competition which favors those industries with war orders which are capable of paying heavy overtime wages.

Remedies suggested which are within the control of the oil industry were largely confined to the pooling of leases, equipment and crews. Next

THE SUMMARY OF OPINIONS

Oil Industry Drilling Program for 1943

Military developments abroad, the demands of the Army and Navy at home, the needs of our Allies under the lend-lease program, and the maintenance of the civilian economy together impose a tremendous obligation upon the oil industry. It may not be long before we are called upon to produce from 10 to 15 per cent more crude daily than we are now furnishing.

	Percentage of Answers received	Percentage of Persons answering
1. *It is my judgment that this obligation can be met:*		
With present facilities assuming continuance of present rate of drilling	7.3	7.7
With present facilities plus substantial increase in the rate of wildcat operations	45.1	47.8
Substantial increase in over-all drilling operations, possibly to the 1941 figure of 32,000 wells	47.6	50.8
2. *Assuming that an oil shortage in the near future is within the range of possibility, I feel that steps should be taken to avert it by:*		
Increase in the present price of crude oil (44c per barrel)*	29.3	75.6
Greater allocations of steel to the industry by the WPB	22.1	57.0
Modification (or elimination) of the 40-acre spacing order	19.7	49.7
Special consideration by the Manpower Commission so that working forces will not be further depleted	24.2	62.8
I do not believe an oil shortage will occur within the next 2 years	4.7	12.2

*Average estimate.

Oil Industry Manpower Problem

It is likely that the oil industry in this country will be called upon to produce 4,500,000 bbl. of crude oil daily for possibly 2 years.

	Percentage of Answers received	Percentage of Persons answering
1. *In the light of expectation, the industry's manpower situation is:*		
Fair	25.5	25.5
Serious	57.5	57.5
Critical	17.0	17.0
2. *Recognizing that there are existing shortages within the industry, I am most concerned about:*		
Semiskilled workers (i.e., roustabouts)	33.0	58.3
Skilled workers (i.e., drillers)	33.0	58.3
Technical men	22.8	40.4
Office help	9.7	17.2
Managers and executives	1.5	2.7
3. *The existing shortage of men due to enlistments, draft and losses to other industries has resulted in our:*		
Inability to drill good locations	20.0	27.4
Inefficiently operating producing leases	36.4	50.0
Inability to maintain full refinery operations	11.4	13.0
Inability to expand our business in accordance with our opportunities	34.2	46.9

came the hiring of more women by the industry and the recalling of men on the retired list for jobs that they could do.

Industry Drilling Program

In estimating the drilling requirements in case it is necessary to increase crude production from 10 to 15 per cent above present levels, a small minority thought it could be done by a continuation of activity at present levels. Nearly half thought that this production could be obtained if wildcatting were to increase, while a slightly larger number considered that a return to the level of activity attained in 1941 is necessary.

Few have any confidence in any one way of meeting the prospective oil shortage. An increase in price, not of a few cents but of as much as 44 cents, represents one requirement of three-quarters of those replying. Next came maintenance of an adequate working force followed by increased allotments of steel. Nearly half of those answering asked for a modification of M-68, while there were a small group of optimists who do not believe that there will be an oil shortage within the next 2 years. That only one man in eight in a responsible position in the oil industry holds such a view is worthy of close attention.

In addition to answering the questions, those replying were asked how best to acquaint the War Production Board and the Office of Price Administration with the needs of the industry in such a way that they would be impressed. The great majority recommended increased publicity by associations, individuals, companies and the trade press, direct or through PAW, Congress or PIWC. A number felt that this was unnecessary as there were increasing signs that the gravity of the problem was already impressing government while still others thought that nothing would do any good, excepting, possibly, a wholesale clearing out of several departments. The suggestion was also made that if about half of the government bureaus were drafted into the Army to replace oil and other workers, there would be a general benefit to all.

A few men considered that a return to the days of wide-open production would solve the industry's difficulties as it was now "too engineered." These were far outnumbered by those who thought that reserve appraisals and estimates of possible production were too high and that the situation was not being viewed realistically even by the industry itself. The majority opinion, however, seemed to be that the industry was working on a sound basis and that intensification of efforts along present lines would compel those in authority to give it its rightful position as one of the essential war industries.

Federal Order Digest

PAW Orders

Supply Order 1, amended: Restricts inventory of resellers to 10 days' requirements, effective January 11.

OPA Rationing Orders

Fuel Oil—RO 11, Amendment 27: Aids petroleum industry in delivery problems, providing "overlap" periods in validity dates between expiration of current ration and issuance of renewals, effective January 20.

Fuel Oil—RO 11, Amendment 28: Authorizes consumers of 200 gal., or less, per year to redeem their ration coupons at any time, effective January 20.

Fuel Oil—Special Ruling: Authorizes dealers or suppliers to limit sales to customers to a percentage of currently valid coupons presented as long as customers are treated alike, issued January 16.

Gasoline—RO 5-c, Amendment 12: Sets up machinery for issued C cards to news photographers transporting nonportable equipment, effective January 14.

Gasoline—RO 5-c, Amendment 13: Requires OPA approval before reduced mileage resulting from recent B and C coupon cuts in eastern states can be restored, effective January 13.

WPB Priority Orders

General—PR 13, official interpretation: Provides that special sales of materials may be made to others in the same business as the seller; continues other restrictions of Regulation 13, including reporting requirements of any redistribution program, issued January 13.

Tank Cars—PR 88, Interpretation 1: Disposes of legal technicality which required carriers to secure authorization before repairing rolling stock, effective January 15.

Manila Cordage—M-38, correction: Substitutes 20 per cent for original authorization of 60 per cent on manufacturers' permitted sales for first quarter of 1943 for civilian purposes, issued January 15.

Chemicals—M-161, amended: Puts five chemicals, spodumene, domestic kyanite, domestic sillimanite, talc and diatomaceous earth, back under inventory control of Priority Regulation 1, effective January 15.

Synthetic Rubber—M-178, amended: Limits manufacturers of butadiene to shipments of 125 lb. over and above customer's quota, effective January 9.

Synthetic Rubber—M-170, amended: Restricts manufacturers of styrene to deliveries of 50 lb. over and above customer's quota, effective January 9.

Synthetic Rubber—M-153, amended: Prohibits deliveries of more than 50 lb. acrylonitrile over and above quotas, effective January 9.

WPB Limitation Orders

Electric Motors—L-221, amended: Prohibits acceptance of purchase orders for electric motors and generators unless they bear preference ratings of AA-5, or higher, effective January 15.

WPB General Regulations

Chemicals—Monthly distribution of chemicals for January issued under allocation orders of Chemicals Division, amounting to $85,400,000 for the month.

Brass and Bronze Castings—Downgrading chart issued to guide engineers and designers in specifying lower grades of critical material Available from Specifications Branch, WPB Conservation Division.

Welding—Completes plans for establishment and operation of resistance welding equipment clearing house by Resistance Welding Unit of General Industrial Equipment Division, in cooperation with Redistribution Division.

Salvage — New Salvage Division created under direction of Paul C. Cabot.

Paints—Technical subcommittee of the Protective and Technical Coatings Industry Advisory Committee urges conservation of drying oils for paint and experiments with substitutes.

Material Conservation — Howard Coonley, New York, formerly chairman of the Walworth Co., and a past president of the National Association of Manufacturers, made director of new WPB Conservation Division.

Commodities—F. H. Cabot made chief of Commodities Bureau. He was formerly vice president of Stone & Webster, Inc.

ODT General Statements

Commercial Vehicles—Reminds all owners that all "idle" trucks, buses and other vehicles, except taxicabs, rental cars, ambulances and hearses, must be reported to ODT.

LABOR BOARD RULINGS

National War Labor Board voted for inclusion of maintenance-of-membership and check-off clauses in contract between Shell Oil Co., Inc., at five California plants. About 2,700 employes involved.

S.A.E. Reviews Work of Equipping The Nation's Military Forces

by Arch L. Foster

Members of the Fuels and Lubricants Activity: Seated, C. B. Veal, formerly research chief, now secretary of Cooperative Research Council; Genevieve Walmsley, secretary to Mr. Veal. Standing, W. B. Ross, chief chemist, Pure Oil Co.; C. H. Baxley, Socony-Vacuum Oil Co., Inc.; A. E. Becker, Standard Oil Development Co.; Earl Bartholomew, Ethyl Corp.; J. M. Campbell, General Motors Research Division, and Prof. L. C. Lichty, mechanical engineering school, Yale University

DETROIT, Mich.—The Society of Automotive and Aeronautical Engineers sounded a command to its ranks to "double time" in its annual meeting here last week as it revamped plans to turn out this year the greatest mechanical war armada ever known to the human race. Every meeting and every paper presented gave all that can be disclosed of the innumerable problems, successes and difficulties faced and solved by these engineers in their work to equip our Army and Navy with machines with which to win the war.

With the totally unprecedented development in aviation in the next 5 years, said retiring S.A.E. President A. W. Herrington, Marmon-Herrington Co., this country cannot look to England or any other nation to act as a buffer between our unpreparedness and an attacking enemy.

"A return to isolationism," said Mr. Herrington whose contacts and experience are world wide in building military equipment, "is a positive step to national suicide."

The automotive-aeronautical engineering team, formed from the army of technical men in both industries, have built the organization which is furthering at a stupendous rate the production of products necessary for winning the war against the Axis, Max Short, incoming president, told the engineers. Their pooling of methods and experience has increased the pace of production and the efficiency of the equipment to the point that "American airmen, in American aircraft . . . are downing enemy planes at the rate of about four to one. In the newest tanks the crews are knocking off Axis tanks at 2,000 yards."

Oil men cannot now think in terms of products and requirements of former years, says Brig. Gen. Walter B. Pyron, chairman of War Department committee of liquid fuels and lubricants. He explained in considerable detail why specifications for these products must be rigid. Extremes of climate and of operating conditions, from the heat of the desert above 120° to 30° and 40° below zero, all within in the space of a few minutes is the common lot and prospect of the aviation engine, he stated. In Africa for example the engine may warm up and take off at above 100° F., but in a very short time must continue to operate, generally at diving speed in the subzero temperatures of 25,000-35,000 ft. elevation at which fighting occurs. The fuels and lubricants must continue to function under both extremes.

Army specifications are not perfect, the general stated. They will be changed as need arises and we know more about what is more efficient. For example it may be necessary to change lubricant specifications 2-104A because of the present scarcity of one chemical which is used in it, a shortage which developed after the speci-

fication was written. During the war the number of lubricant grades has been reduced to one-half, in some cases to one-third, of the number before hostilities began. Only four grades of fuel are used, 80-octane number, 87-91 and 100-octane number, and diesel fuels. Experiments are under way to combine the A and B divisions of the 80-octane specification into one, General Pyron pointed out. The big problem is hard starting on one hand and vapor lock on the other; many tank engines are radial airplane type power plants, and the construction allows too little cooling in the severest operations.

Civilian, nonmilitary and commercial-automotive problems were not neglected in the 5 days' program. One of the most important problems is that of maintaining available equipment and keeping it functioning at its top efficiency now that the automotive industry has become an all-out war industry and cannot replace this peace-time transportation fleet.

***Above:** Bruce Boehm, Standard Oil Co. of New Jersey; H. R. Grigsby, Oklahoma Gas & Electric Co.; B. E. Sibley, Continental Oil Co.; A. Ludlow Clayden, Sun Oil Co., and Norman G. Shidle, executive editor, Journal of the Society of Automotive Engineers, all active in the war engineering meeting*

***Right:** John T. McCoy, general supervisor, research and development, Tide Water Associated Oil Co., and T. B. Rendel, formerly chief engineer, aviation department, Asiatic Petroleum Co., and now chief fuel technologist, British Air Commission, Washington, D. C.*

Spark Adjustment Best

Commercial engines for heavy duty as in trucks are more severe on fuels than are passenger car engines and road ratings in these engines depreciate the standard C.F.R. ratings and road ratings in passenger car engines, D. P. Brenz, H. H. Maxfield and C. B. Culbertson of Shell Oil Co., Inc., have found. For example an A.S.T.M. 70.5-octane number gasoline, which rating agrees well with passenger car engine road ratings, was depreciated 2.5 octane numbers at low speeds and 4 octane numbers at high speeds in a truck-engine-test series. Spark adjustment is the best and "least harmful" method for tuning engines to operate on motor fuels of differing octane ratings, they stated. Retarding spark timing by 5° reduces by six to eight units the octane requirements of commercial engines with only 5 per cent acceleration (power) loss. Retarding the spark sufficient to compensate for a 5-octane number drop caused a slight power loss. Under the same conditions correcting for detonation elimination by enriching the air-fuel ratio from 13 : 1 to 9.6 : 1 caused a loss of 13 per cent in acceleration at low speeds and 10 per cent at high speeds.

Retarding the spark on heavily loaded engines 5 per cent, giving knockless operation on fuel 6 to 8-octane numbers lower in rating, and a maximum of 5 per cent mileage reduction, resulted in 2½ per cent average reduction as compared to results obtained when using a fuel which permitted knockless operation at standard spark timing. Spark timing changes therefore have less effect on fuel consumption than on power loss and much less effect on power loss than has use of an over-rich mixture to avoid detonation. Operating a group of engines on fuels of 77, 70.5 and 66-octane number (A.S.T.M.) it was found that these fuels permitted a 1½° advance, a 4½° retard and a 9° retard from the standard setting.

Light detonation is permissible in passenger car engines without serious difficulty. In heavy duty engines, because of the large proportion of time they are operated at or near full throttle, light knock will build up into preignition entailing a serious power loss and increasing maintenance costs. Heavy duty engines appear to be set at standard spark timing very near the maximum power output. Using fuels of ratings higher than required for the standard spark setting, therefore, may not show appreciable improvement in performance. Many passenger car engines have the standard spark setting well below—5° to 10°—than for maximum performance and thus may show better operation with higher octane rating fuels. Tests showed that truck drivers noted no differences when running on fuels differing by 4 or 5 octane numbers, when sparks were adjusted to avoid detonation, so far as road performance is concerned.

Commercial vehicle engines should be included in future C.R.C. engine-fuel surveys, these authors say, in order to have more representative data on the entire field.

Engine wear is almost inversely proportional to the kinematic viscosity of the crankcase oil used, Dr. H. A. Everett, Pennsylvania State College engineering authority reported, after extensive experimental testing in a series of engines with six mineral oils. These oils ranged in viscosity from

heavier than S.A.E. 70 to lighter than S.A.E. 10W, the lowest viscosity being about 75 S.U.v. at 100° F. Determination of wear was made by determining the amount of iron, found in the used oil in a semicolloidal state, in the crankcase drainings after operating the engine at 230° crankcase temperature and 450° F. at the cylinder head.

Iron content of the used oils showed a wear as follows: 75 neutral, 1.713×10^{-5} lb.; SAE 10, 1.714×10^{-5} lb.; SAE 20, 1.648×10^{-5} lb.; SAE 30, 1.489×10^{-5} lb.; SAE 50, 1.229×10^{-5} lb.; SAE 70, 1.092×10^{-5} lb. The kinematic viscosities, in centipoises, are 14.38, 39.40, 53.55, 103.0, 219.0, and 518.3, respectively.

This method of determining wear has been in use by Dr. Everett's laboratory for 7 years, and is that originally developed by Boerlage in the Shell laboratories in Delft, Holland, in testing diesel-engine wear rates (The Motorship-British, Vol. 13, p. 171). A 10-g. sample of used oil is burned to ash, dissolved in HCl, treated with dilute ammonium sulfocyanide and the intensity of color is compared with similarly treated samples of known iron content. The sensitivity is high, one part in 50 million being determinable with an accuracy of 0.2 per cent.

Substitute Bearing Alloys

Testing bearing alloys in the Underwood machine, probably the most commonly used empirical test method, has shown that tin-base bearing alloys exhibit negligible corrosion under practically all conditions tried. L. M. Tichvinsky of the Naval Experiment Station, has found also that the corrosion of lead-base bearings is moderate and uniform over the surface. White alloys corrode in localized manner for unexplained reasons and the rate is high.

In tests as high as 350° to 375° F., tin-base babbitt bearings did not corrode appreciably. Among lead-base alloys the least corrosive were those containing arsenic and silver. Alkali-hardened lead alloys showed low corrosion with No. 2190 oils, but high corrosion with No. 3065 oils. In case of the latter, the neutralization number of the oil rose to 13.80 after 30 hours at 325° F. With a moderately corrosive oil copper-lead alloy showed excessive loss, lead being removed from the bearing for a considerable depth. With a low-corrosive oil no lead loss was found after 40 hours' test. Results of this research show that arsenic and silver makes low-corrosion bearings of lead-base babbitts and that further research is needed to find other methods of combating corrosion in these alloys and others, to find tin substitutes low in corrosion susceptibility. Control of most of the world's tin supply by the Japanese in the East Indies makes this development imperative.

The cracking time for diesel engines is shortened by an increase in cranking speed and decrease in altitude, H. R. Porter of Standard Oil Co. of California reported. Starting performance of undoped fuels may be predicted from the delay-cetane number. Engines start easier on higher cetane number fuels. When fuels are doped to improve cetane number this may or may not improve cold starting, Mr. Porter stated. For example, the use of chloropicrin, amyl nitrate, sulfur and disulfides improved starting in line with their doped cetane numbers. Neither ethyl nitrate nor bromocyclohexane improved starting alone although increasing cetane number. When both were used in a fuel, the resulting starting performance was in agreement with the doped cetane number. It has been found that chlorine, hydrogen sulfide, amyl nitrate, ethyl disulfide and chloropicrin aid in cold starting, when added to the intake air. This fact has suggested an auxiliary "applicator" to be connected to the fuel system to promote starting under severe conditions. Such an operation requires that the effect of these dopes, so used, on engine maintenance must first be determined.

For the best starting results, from 75 to 85 per cent more fuel must be injected in the diesel engine than is delivered by the injection pump for maximum power output, Max Roensch of the Chrysler Corp. engineering division, has found. Consequently it is desirable to develop some auxiliary means by which this excess fuel may be injected for starting, especially under cold-weather conditions. Further research by the oil companies to discover a better additive to promote easier starting in cold weather is also desirable, he stated. Such factors as different spray patterns, special nozzle designs, "throtting" and standard types of nozzles, nozzle opening pressure, etc., have little effect on starting, although a finely subdivided spray pattern is usually desirable.

DEATHS

Charles L. Baker, 52, assistant superintendent of the gasoline department of Texas Co., Tulsa, died Saturday in a Tulsa hospital after being unconscious since the day after Christmas. Death was attributed to encephalitis. He became ill at Thanksgiving time and a month later lost consciousness. His widow and a son survive.

George Edward Gilmer, 79, retired oil operator and civic leader of Shreveport, La., died last week at the home of his daughter, in Shreveport.

John W. Herbert III, whom the War Department has just announced was killed in action in New Guinea, was a Fort Worth, Tex., oil man. He was prominent in politics, and was active in the Republican party.

Frank J. Hopkins, director of the right-of-way department for Natural Gas Pipeline Co. of America, died in Chicago last week. Mr. Hopkins resided in Amarillo, Tex., from 1935 until 1940, during which time he was associated with Texhoma Gas Co. His widow, a son and a daughter survive.

C. A. Meyer, 59, treasurer of National Supply Co., died last week in Pittsburgh, Pa. Funeral was held Monday afternoon. Mr. Meyer was well known in Southwest oil circles. He had been treasurer of his firm for 20 years.

Charles LeRoy Stotts, 35, a mechanical engineer with Bareco Co. for several years, died at a Wichita, Kans., hospital, last week, after an illness of 2 years. Besides his widow he is survived by a son and a daughter.

W. R. Barney, 61, manager of the Norris Manufacturing Co.'s Kilgore, Tex., plant for 10 years, died in Tulsa. He was in charge of war work for the company. His widow, two daughters and two sons survive.

Frank L. Wiegand. 64, assistant treasurer of Oil Well Supply Co., died January 11 at his home in Dallas, Tex. Born in Butler, Pa., he joined Oil Well Supply Co. in 1898 as bookkeeper at the company's Butler store. In 1921 he was appointed district manager at Shreveport, La., and in 1929 was transferred to Tulsa as director of merchandise. He moved to Dallas in 1932. He is survived by his wife, a son and a daughter.

Phillips Bids $1,265,000 For Dunning Properties

A bid of $1,265,000 for the West Texas oil properties of the William H. Dunning, Jr., estate submitted to probate court in Fort Worth, Tex., by Phillips Petroleum Co., Bartlesville, Okla., topped three previous offers and is now pending final approval before the transaction is consummated.

Buffalo Oil Co., Dallas, Tex., opened bidding several weeks ago for the Dunning properties with an offer of $960,000. Later, Stanolind Oil & Gas Co., Tulsa, entered an original bid of $1,055,000 which was subsequently raised to $1,200,000 when Southland Royalty Co., Fort Worth, proposed to pay $1,106,000 for the properties.

In addition to the $1,265,000 in cash offered by Phillips, of which $200,000 is to be placed in escrow, the deal carried one-sixteenth override on 3,460 acres of wildcat leases in Gaines County, West Texas. Other properties involved include 25 wells on 1,040 acres in the Goldsmith field, Ector County, Texas.

CHEMICAL TRENDS in the Petroleum Industry

by J. C. Walker

RAPID advances in refining technology have made it possible to produce increasingly greater yields of higher quality and more valuable products from every barrel of crude oil processed.

The tremendous technical activity of the industry in recent years, which has offered employment to over 10 per cent of all the research and development workmen in the United States, combined with a struggle for the motor-fuel market, resulted in the rather recent so-called "octane race." This race seemed unnecessarily burdensome to the petroleum industry because of resulting technologic obsolescence. Equipment, costing millions of dollars to construct, was in some instances outmoded before its installation was complete. While the struggle for octane supremacy seemed at times to exceed all reasonable bounds, it was perhaps a blessing in disguise in light of the war which has since been forced upon us. The experience gained has made it possible to quickly and economically produce a huge tonnage of fighting aviation fuels of 100 octane, or even higher rating, if need be. Such aviation fuels have given, pound for pound, an increase in power of about 20 per cent over the 87-octane grades and an increase of 50 per cent over the 70 octane gasoline in use 10 years ago.

The battle fronts of the world are providing testing and development laboratories for motor-fuel developments with the very existence of nations at stake. The chemist played no mean part in the epic fight to save Britain. Development in American laboratories to produce fuels that would get the combat planes off the ground quicker, accelerate their rate of climb, provide greater and greater speeds and longer and longer ranges, contributed in no small measure to the success of that defense.

Fuels can now be made that have ratings beyond the octane scale, and estimated numbers are of the order of 115, possibly even higher. This means that such fuels could deliver half as much power again as 100-octane fuel.

Postwar Prospects

What of the situation after the war? From the petroleum chemist's viewpoint, all automobiles now on the roads are obsolete. What fuels will be used in the postbellum automobile?

Consider 100-octane aviation fuel for a moment. Production of this material will probably exceed, at no far distant date, 7,000,000 tons (56,000,000 bbl.) per year. This material contains approximately 50 per cent of a synthetic organic chemical which, some 15 years ago, was a laboratory curiosity. If, at that time, a ton of this material could have been obtained it would have cost in the neighborhood of $10,000. Compare this with an annual production of about 3,500,000 tons of the same product, as part of a material which sells at the refinery for about $50 per ton.

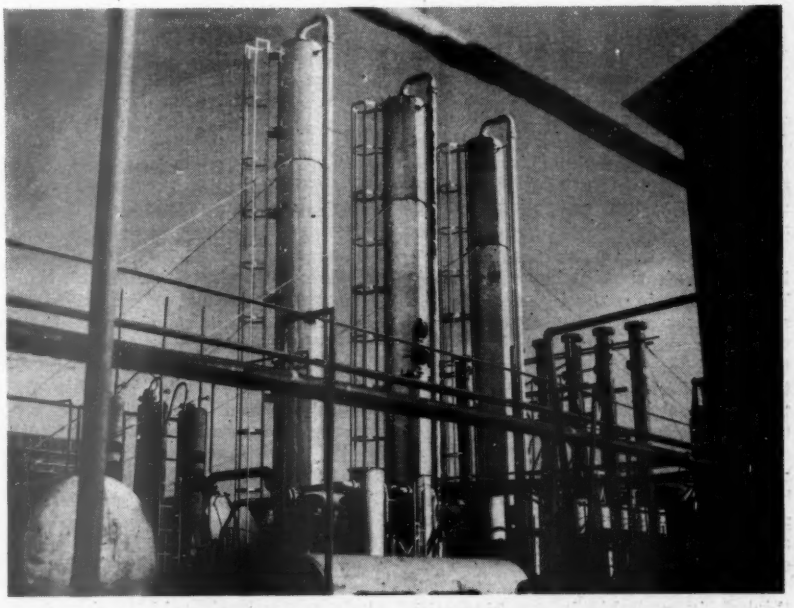
It is thought provoking to consider the effect of what may be done with this 7,000,000 tons of 100-octane fuel in the period after the last gun has been fired. It is reasonable to believe that temporarily, at least, aviation requirements may drop sharply, making much of this material avail-

The paper of which this is a slightly abridged version was presented at the meeting of the Oklahoma Mineral Industries' Conference in Oklahoma City by John C. Walker, Bartlesville, Okla., general superintendent of the chemical division, Cities Service Oil Co.

J. C. WALKER

He was employed as chemist by Cities Service in September 1917. After serving 10 years as production chemist at Oil Hill, Kans., he was transferred to Tallant, Okla., to supervise construction and initial operation of a new plant for the controlled partial oxidation of natural-gas hydrocarbons and directed further research there relating to production of chemicals.

Mr. Walker was transferred to the Bartlesville office in 1930 as superintendent of chemical operations and later was made general superintendent of the division, his present position.



General view of the Tallant, Okla., chemical plant of Cities Service Oil Co.

able for use in automobile engines. If such engines were designed to take full advantage of these fuels, economies 50 per cent better than are now realized, or power output from 70 to 100 per cent greater than is now obtained, would be possible.

In addition to the intensive research and development program toward more and better fuels, under the drive of war requirements, similar programs are simultaneously operating towards new and more stable lubricants of greater oiliness to meet the rigid demands of combat machinery. Molecules in the lubricating oil ranges are being torn down and reconstructed along new lines designed to provide characteristics not previously obtainable in any natural product.

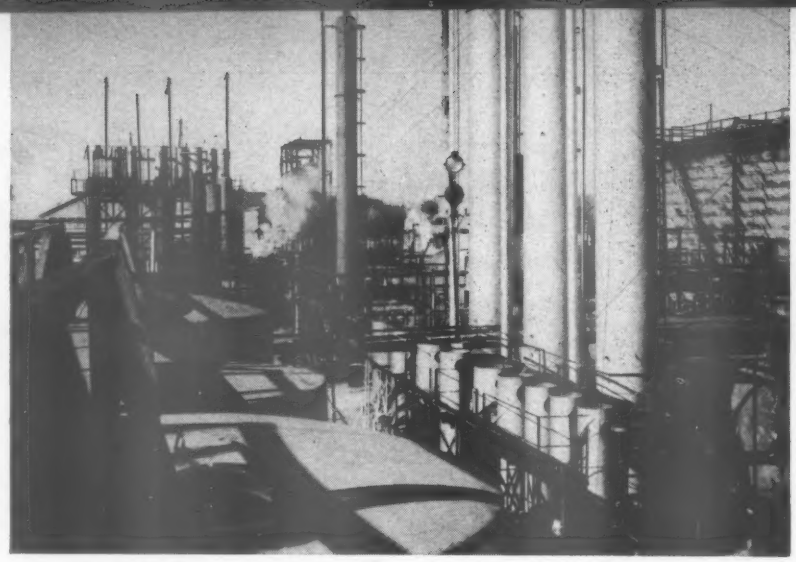
In addition to the products which may be considered normal to the oil business itself, it must be realized that petroleum hydrocarbons, gases, and natural gas constitute a rich storehouse of raw materials upon which a large chemical industry is founded.

Butadiene

This great source of raw materials for the chemical industry includes a product which has been the subject of much attention and concern on the part of the general public, as well as of the petroleum and chemical technologis. The product is butadiene, and the general class remains a petroleum hydrocarbon but of the unsaturated-hydrocarbon series. Butadiene is, as almost everyone is now well aware, essential to the production of synthetic rubber, particularly of the buna-S type upon which the bulk of the present synthetic-rubber program is based. Normal butane is readily converted into butadiene by catalytic methods at high temperatures in reasonably good yields. Styrene, the other component of the buna-S coplymer is synthesized from benzene (which is normally derived from the coal-tar industry but which can be produced from petroleum's normal hexane) and ethylene. The latter compound constitutes a substantial proportion of cracking-still gases.

Another type of synthetic rubber, planned for production in smaller quantity is butyl, a copolymer of isobutylene and about 2 per cent of butadiene or isoprene. The isobutylene may be obtained by dehydrogenation of isobutane from natural or cracking-still gases. This rubber is not, as yet, as satisfactory for tires as the buna-S type, but is said to be good for 12,000 miles in ordinary service at 35 miles an hour or less. The synthetic-rubber program contemplates production of 132,000 tons of butyl rubber annually in comparison with 705,000 tons of the butadiene-styrene type.

Neoprene, another synthetic rubber, is made from acetylene treated with hydrochloric acid. This rubber has been on the market for several years and its use had expanded in spite of high cost, even while natural rubber was still plentiful and cheap, simply because of its excellent resistance to oils.



Methanol and solvent rectifying and fractionating columns at the Tallant plant

Acetylene, an unsaturated hydrocarbon, has heretofore been made from calcium carbide produced in the electric furnace. Large plants are now under construction for the production of acetylene by high temperature cracking of hydrocarbon gases such as ethane, propane, and butane, which are obtainable from natural and cracking-still gases. It is quite possible that production of acetylene by this process will permanently displace production from calcium carbide, because of its economies.

Acetylene may likewise be readily converted to acetaldehyde and acetaldehyde may be reduced to ethyl, or grain, alcohol or may be further oxidized to produce acetic acid or acetic anhydride. The latter products are essential to the manufacture of cellulose-acetate plastics, made by reaction of acetic acid or anhydride with cellulose which might be obtained from cotton or other vegetable or wood fibers. Acetylene is also the essential source material for the manufacture of nylon, as well as of the acetate silks.

Returning to the subject of rubber, thiokol should be mentioned. This product is made by chlorinating ethylene gas and refluxing the product with sodium polysulfide. The synthetic-rubber program provides for the manufacture of 60,000 tons of thiokol yearly. It will be noted that this rubber contains both sulfur and chlorine, while natural rubber is a hydrocarbon containing carbon and hydrogen only. Thiokol cannot replace natural rubber in all uses but among other desirable properties has excellent resistance to oil.

Ethylene, for the production of thiokol, is available in cracking-still gases and could be produced from natural gases by dehydrogenation or by cracking at high temperatures. The chlorine required could be obtained by electrolysis of salt solutions obtainable from oil-well brines, and this production of chlorine would simultaneously product caustic soda. Many natural gases contain high percentages of hydrogen sulfide. Hydrogen sulfide gas, passed into a caustic soda solution, will produce sodium sulfide. If a portion of the hydrogen sulfide is oxidized to sulfur dioxide and this in turn is allowed to react with unburned hydrogen sulfide, flowers of sulfur is produced. Flowers of sulfur dissolved in sodium sulfide will produce sodium polysulfide, which when reacted with ethylene dichloride will produce thiokol.

Sulfuric Acid Production

In passing it may be mentioned that production of sulfuric acid from hydrogen sulfide is quite possible where adequate supplies are available and the acid shipping costs to the point of consumption are not prohibitive. "Flowers of sulfur" produced from hydrogen sulfide makes an excellent product for agricultural uses.

The part that will be played by the petroleum industry in the synthetic rubber industry after the war is over is obscure. Controversies have arisen as to the best source of butadiene, whether from petroleum hydrocarbons, from fermentation alcohol, or from butylene glycol, likewise produced by fermentation of grains. Time and the operation of economic laws may be depended upon to finally determine the source products for synthetic rubber. For the immediate future butadiene in the great volumes required can and will be largely obtained from petroleum hydrocarbons.

Another chemical of vast importance in the conduct of the war, toluene, is now supplied in tremendous tonnage by the petroleum industry. Toluene, when treated with nitric and sulfuric acid, produces the vitally important military explosive,

trinitro toluene, commonly known as "TNT."

It seems rather strange that the petroleum industry should supply such a large proportion of toluene, a member of the coal-tar family, but it is just another example in which the chemist, in his role of "atomic architect," has rearranged petroleum's straight chain heptane into the ring structure of coal tar's toluene. Similarly, when petroleum's hexane, a straight chain of six carbon atoms is bent into the ring structure of benzol, the reactions may be likened to the hoop-snake in the act of swallowing its tail.

In all cases previously touched upon, the petroleum industry has appeared essentially as a hydrocarbon raw-materials source for chemical, explosive, or rubber manufacturers. In recent years the petroleum industry has considered the possibilities of undertaking, on its own behalf, conversion of its hydrocarbons to chemical products of greater value. Various petroleum companies have been very successful in such ventures and such products as alcohols, aldehydes, glycols, glycerin, ketones, soaps, ammonia and many other materials have been produced with marked success.

300,000 Compounds Possible

In order to maintain a reasonable perspective and balance in considering the production, from petroleum hydrocarbons, of one of the 300,000 or more possible chemical compounds which may conceivably be made from these hydrocarbons, it should be remembered that very few individual chemicals can ever be sold or used, no matter how cheaply offered, in volumes comparable to those of the motor-fuel markets. The keg or barrel is a larger unit for most chemical products than is the tank car for petroleum products, used as fuels, but often the barrel of chemical has more value on the market than the entire tank car of petroleum fuel. Individually, a chemical compound, even the larger tonnage items of the chemical industry, has but a limited-tonnage market in comparison with motor fuel. Collectively, because of the vast potential number of valuable chemicals derivable from petroleum and natural gas, the field is enormous.

It seems fairly obvious, then, that conversion of petroleum or natural-gas hydrocarbons to any single chemical or small group of chemicals can scarcely be relied upon to solve all the problems of large surplus production of petroleum experienced in times past or to provide an adequate outlet for all natural-gas supplies which now have no pipe-line connections.

Various companies in the petroleum industry are already manufacturing chemical products in one or more of the broad fields later outlined. Certain of the fields mentioned have not as yet been entered by petroleum companies.

1. Perhaps the earliest entrance of petroleum companies into the field of chemicals production involved the absorption of the ethylene hydrocarbons, contained in cracking-still gases, in sulfuric acid to form alkyl sulfuric acids which are in turn hydrolyzed to secondary alcohols and recovered as such.

Ethyl, isopropyl, secondary butyl, amyl, hexyl, and higher secondary alcohols have all been produced in large volumes. These alcohols may be reacted with acetic acid to form the corresponding esters which are excellent solvents.

Isopropyl alcohol, so produced, may be catalytically converted to acetone, a valuable organic solvent. Mixed ketones such as methyl-ethyl ketone and other ketones may be similarly produced.

In 1939 one petroleum company alone is reported to have produced a total of over 50,000,000 lb. of various solvents of this character.

2. A second important field lies in the oxidation of petroleum hydrocarbons.

(a) Controlled - partial oxidation, particularly of the gaseous hydrocarbons is accomplished by reaction with oxygen of the air. By this reaction method, formaldehyde, acetaldehyde, higher alcohols, acetals, ketones, and other products may be produced.

Formaldehyde is of particular importance in the synethetic-resins field. Phenol, cresols, urea, melamine and other products are reacted with formaldehyde to form the thermo setting or bakelite-type resin and also oil soluble varnish resins.

Methanol, produced by this process, provides an excellent automobile radiator antifreeze, may be converted to formaldehyde, used as an organic solvent, used in the refining of petroleum and for many other purposes.

Acetaldehyde may be converted to resins, acetic acid, etc.

(b) Gaseous hydrocarbons may also be converted by air and steam, using the water-gas reaction, to produce hydrogen and carbon monoxide. These may be reacted to form methanol using high temperatures, pressures of the order of 4,500 lb. per sq. in. and suitable catalysts.

Similarly, hydrogen, produced by the water-gas reaction from natural gas, may be reacted with nitrogen of the air under comparable pressure and temperature conditions, but with a different catalyst, to form gaseous ammonia.

The production of ammonia is exceedingly important to the war effort and several large plants for production of anhydrous ammonia by this process are now under construction. Ammonia is readily converted to nitric acid by catalytic oxidation with air. All military explosives contain nitrogen either as nitrate nitrogen, ammonia nitrogen, or both. Ammonia reacted with nitric acid produces ammonium nitrate which constitutes the bulk of such explosives as ammonal, anotol, etc.

Treatment of Toluene

Toluene, when treated with nitric and sulfuric acid, is converted to dinitro toluene (DNT) or trinitro toluene (TNT) both of which are vital military explosives. Published reports indicate that 250 to 300,000,000 gal. of toluene will be required annually in the present war. Though toluene has always been considered as a coal-tar chemical, it is reported that only 25,000,000 gal. will be supplied by the coal-tar industry. The balance will be produced from petroleum hydrocarbons by the oil industry.

3. A third important field is in the making—the nitroparaffins. A chemical company has pioneered in this utilization of petroleum hydrocarbons and now produces commercially nitromethane, nitroethane, and 1- and 2-nitro propanes, all of which are produced by the vapor phase nitration of propane.

This field has been barely scratched, but many important uses of this reaction and its products are already evident. It is believed that this field is particularly worthy of attention in view of the large potential production of ammonia which will be available when hostilities cease.

The nitroparaffins may prove of immense importance in the explosives field. Tetranitromethane, as an example, is an explosive of terrific power but thus far it has apparently not been developed as a military explosive.

4. A fourth large field lies in the chlorination of petroleum hydrocarbons. This involves the addition of chlorine to the hydrocarbon in many possible ways to produce many possible chlorine derivatives. A chemical company has also pioneered in this field.

From methane, for example, such familiar chemicals as chloroform and carbon tetrachloride are possible. Chlorinated hydrocarbons of rubber like consistency are currently being produced, such as pliofilm, koroseal, etc. The synthetic rubber, "thiokol," is previously mentioned as requiring chlorinated ethylene in its production.

Various combinations of these previously mentioned fields are possible to produce such varied products as textile wetting agents, hard water soaps, laundry detergents, cosmetic soaps and creams. It is not inconceivable that fatty acids of good purity may be made and reacted with synthetic glycerin, made from propylene, to produce edible fats. Synthetic butter or synthetic lard is not at all beyond possibility.

The PETROLEUM SHORTAGE

In the United States

by Benjamin T. Brooks and L. C. Snider***

B. T. BROOKS

Authors of this paper which focuses attention on certain aspects of the threatened petroleum shortage have achieved high rank in the technical and scientific fields of the oil industry. Benjamin T. Brooks, New York, consultant in chemical engineering and research, was American editor for the four-volume Science of Petroleum. He was retained by Venezuelan Government in 1940-41 in a consulting capacity and, in 1942, spent some time in Mexico for the U. S. Department of State, assisting in settling the oil-expropriation controversy. L. C. Snider, now professor of geology at the University of Texas, Austin, served as president of the American Association of Petroleum Geologists in 1940 and was previously chief geologist for Cities Service companies.

L. C. SNIDER

THE necessity for rationing and drastic curtailment in the use of gasoline and fuel oil on the eastern seaboard by reason of lack of adequate transportation and the need for general curtailment of automobile driving in other parts of the country on account of the temporary necessity for conservation of rubber, is well known. However, these much-publicized difficulties have obscured, at least in the public mind, the more fundamental difficulty of an indicated petroleum-production shortage.

If the rate of finding new oil shown during the last 3 years is continued for the next 3 years, and production is forced to meet current needs, the damage to many fields will rapidly accentuate the shortage, and estimates of net ultimate producible oil from known reserves will have to be revised sharply downward.

This situation does not come altogether as a surprise to many who have followed the matter. In 1936 the writers published "Probable Shortage of Petroleum in the United States and Methods for Its Alleviation."[1] Some of our conclusions were as follows:

"A consideration of probable rate of domestic consumption, decline of production from present producing fields, and the chances of discovering new fields leads the writers to the conclusion that there is a possibility of a shortage of domestic petroleum in the United States as early as 1940 and a probability of a considerable shortage by 1945."

The facts brought out in this article were never disputed or controverted, but conclusions were not well received by many, particularly by those who had not examined the facts adequately. In 1936 E. W. Marland stated that a serious domestic shortage of crude petroleum was to be expected by 1942 unless large, new reserves were discovered in the meantime.[5]

More recently, Ralph K. Davies, deputy petroleum administrator, stated before the American Petroleum Institute:[2]

"At your meeting a year ago I stressed the decline in oil reserves. The point was that since 1938 production had exceeded discovery. In some quarters this observation was not well received. . . . But I think there is today a ready acceptance of the fact which I stated then. On all sides I hear the assertion that our reserve position is deteriorating, that something must be done to alter the trend."

1941 Shortage 47,000 Bbl. Daily

W. V. Howard,[4] in a statistical review, stated recently that there was a shortage of 47,000 bbl. of crude daily in the last quarter of 1941. This was supplied by imports. "Now that imports have ceased and practically all domestic oil must be transported overland, there is a shortage of 300,000 bbl. daily in the area east of the Sierras if refinery runs are to be maintained at last year's level," he wrote.

On October 22, 1942, Judge William P. Cole, Jr.,[3] retiring chairman of the House petroleum subcommittee, reported to the president and asked the appointment of one man to control prices, acquire essential materials, strategic or otherwise, for necessary drilling, refining and transportation of oil and to restrict or encourage drilling for oil. Judge Cole said in part:

"The cost of finding and producing oil is greater than the price for which it sells. . . . We are certainly headed towards disaster, Mr. President, if we cannot make provision at this time for an increased supply of nearby petroleum. The time lapse between the search for petroleum and its use where needed, is at least 2 years. . . . During the last year we have discovered oil in new pools at the rate of about one-fourth of what we have consumed. Including extensions of existing pools and the drilling of deeper sands, the ratio is somewhat better, but still alarming. . . . We do not know that 3,800,000 bbl. per day will be the limit for our war needs. Our needs may reach 5,000,000 bbl. a day, in which case there is no present prospect of meeting them and all the tanks and trucks and planes grounded in this country for lack of fuel will be of no account. . . . In looking to the future of our country it is obvious that our room for development of virgin territory within the confines of continental United States, is but a fraction of what it has been in the past. . . . During the last year we drilled 3,400 wildcat wells and discovered 400,000,000 bbl. of new oil, about one-fourth of our consumption. In the region at the head of the Persian Gulf (only a portion of the main area) the last 100 wildcats have discovered 12,000,000,000 bbl. of oil."

Last April E. L. DeGolyer,[3] assistant deputy petroleum administrator, called attention to the decreased rate of finding oil and stated:

"For the 5 years 1934 to 1938, inclusive, we found on averages 121 new fields and 1.8 billion barrels of

*Consulting chemist, New York.
**Professor of geology, University of Texas.

oil annually. The average estimated reserve per field discovered was 15.6 million barrels. For the past 3 years, 1939 to 1941, inclusive, the average number of fields discovered annually was exactly double that for the preceding 5 years, being 242 fields. The average reserve discovered dropped to the pittance of 613 million barrels and the estimated reserve per field to the alarming figure of 1.18 million barrels."

H. B. Soyster, of the U. S. Geological Survey, stated in 1934 that the rate of discovery would slow down.[7]

The 75 largest fields in the United States produced only 75 per cent as much oil in the first half of 1942 as in the same period in 1941.

Relation of Reserves to Demand

The above statement and quotations indicate some feeling of concern and even alarm, but are by no means an adequate or complete picture of the present situation. There is almost a certainty that sufficient petroleum can be produced to meet all the war demands of the armed forces, lease-lend requirements and essential civilian needs in the United States during the next 2 years. However, in view of the sharp decline in the rate of finding new fields and the decreasing production of existing fields, it is equally certain that the critical rate of production of many fields will be exceeded with damage to such fields and with lower net-ultimate production. In this sense, a shortage has developed. The immediate necessity for rationing of gasoline and fuel oil, particularly on the eastern seaboard, is due to lack of transportation and the temporary need for the conservation of rubber. The basic situation discussed here should not be confused with the primary causes of rationing.

There is general agreement that the best estimates of proven reserves of petroleum, producible by present methods, are 19 to 20 billion barrels, or about 5 billion barrels more than in 1936. But one of the now generally recognized benefits of restricted and controlled production, including repressuring of fields where possible which came in with proration, is in increasing the net-ultimate production. This is now so widely recognized that voluntary restriction of production is not uncommon. In the early days of proration, many fields were estimated to give absurdly high "potential" production. Thus in the East Texas field, a determination on a few key wells in October 1934 gave the field a potential of 14,355,000 bbl. per hour. Such a rate of production, if sustained, would have completely drained this field of the remaining recoverable oil given it by even the most liberal estimates in about a week.[8] The importance of critical rate of production is well illustrated in the Yates (Texas) field. In March 1931 the potential was rated as 5,508,000 bbl. per day. In 1930 the field produced for a time at the rate of 130,000 bbl. per day and the number of water wells was increasing. A reduction to 89,500 bbl. per day checked the spread of water and "freed" several wells that had been making water. The critical production was, therefore, about 100,000 bbl. per day. The proration umpire of the field estimated that the field could produce 3,500,000 bbl. in 1 day if produced without restriction, but that 98 per cent of the wells would then be showing water and that in 30 days the field could produce only 10,000 bbl. per day. The estimated recoverable reserves of the field were calculated at 800,000,000 bbl. with production held to about 100,000 bbl. per day, but at only 235,000,000 bbl. with unrestricted flow.[5]

Judge Cole evidently had such facts in mind when, in his letter to the president, he stated:

"At the present rate of production, within a year, at our present rate of drilling, it will be necessary to draw upon present producing areas at a rate to cause shamefully inexcusable waste of a considerable proportion of our proven reserves of oil."

Secretary Ickes made a similar statement in a recent radio address. In 1939 R. E. Wilson, testifying before the Cole committee, stated:

"If you had strict engineering principles applied to all oil fields, you wouldn't have enough oil to supply the refineries."

In other words, to gain the more efficient recovery of the most effective optimum rate of production requires a much larger reserve than when the old flush method of production was practiced.[6]

Reflected in Less Production

That decreased rate of finding of new fields is quickly reflected either in less production or in unduly rapid draining of old fields, even with apparently large reserves, is readily understood from the fact that for many years about 50 per cent of our annual production has been from new flush wells which constituted about 2 per cent of the total number producing.[8]

Since the greater efficiency of restricted production has been demonstrated, the estimates of producible oil have been revised upward in recent years, both for old and new fields, and this is reflected in the larger figures for reserves. This larger ultimate recovery is only possible, of course, when restricted-production methods are practiced, and these figures would have to be revised sharply downward if the exigencies of the war compel opening up many fields to exceed their critical rates.

Many earlier discussions of the question of greater recovery of oil commonly stated that only 20 to 40 per cent of the oil in the sands was brought to the surface, and hope was freely expressed that the day of a shortage might be put far off by more efficient recovery. Recent work, however, has shown that in many producing sands, 40 to 50 per cent of the voids is occupied by connate water. When this is taken into consideration, and also the fact that a barrel of oil on the surface represents a smaller volume than the same oil containing dissolved gases under high pressure, it is now estimated that the ultimate recovery of oil in some fields has been as high as 80 or even 90 per cent.

Judge Cole, in his recent letter to the president, said:

"The combination of these facts makes it imperative that many, many years before we have a collapse of our oil productivity, we have a substitute to take the place of natural petroleum."

Recommended Pilot Plants

Judge Cole recommended pilot plants for the manufacture of shale oil and oil from coal. In 1936 the authors stated:[8]

"The writers do not picture a return to horse and buggy days as the result of a shortage of domestic petroleum. The shortage of domestic petroleum will be filled in by imports and substitutes which will come into use as prices become higher. In the ordinary course of events, there should be no very noticeable dislocation of business in the shift from domestic petroleum to imports and substitutes, though prices may have to go inconveniently high for a considerable time while the shift is being made.

"If, however, we should be compelled to meet a wartime demand for petroleum products while the shift is imminent or in progress, the results might be nationally disastrous. Dependence on imports would naturally be hazardous if we were engaged in war, and a large-scale shift to any known substitutes would require an investment of capital and a utilization of manpower which would be a serious handicap to other wartime activities."

The drastic curtailment of Venezuela's production, about 250,000,000 bbl. in 1941, virtually all of which was exported by tankers, was caused by the activity of enemy submarines. Much of this Venezuela petroleum came to the United States, and the curtailment has of course added to present difficulties. Venezuela's production can readily be increased promptly, and full utilization of this source, by strong convoy of tanker fleets if necessary, would go far in relieving present difficulties.

As pointed out by Judge Cole, about 2 years separate the initial effort of finding new oil and its final refining and use. He has proposed raising the government controlled price of crude so that wildcat drilling, on an average, will repay the cost, which now

it does not do. The remedy may not be as simple as that, and in any case the results are uncertain. In 1936 we pointed out that "' . . .No stated price schedule can be depended on to produce a required increase in production in a given time. . . . During the war years (1914-18) and the following period of industrial recovery, the average price of crude petroleum rose from 64 cents in 1915 to $3.07 in 1920. . . . The high prices of the period from 1917 to the middle of 1921 certainly did stimulate the search for petroleum and hastened improvements in drilling methods which permitted greater depths to be reached, and so brought on the flood of oil which began in 1933. In this respect, the high prices did bring about an increased production, but it is maintained that the delay of 5 years in showing an increased production commensurate with increase in price and demand is too great for price control to be depended on as a means of preventing a shortage of petroleum, particularly in times of national emergency." The prospect of substantially increasing production by raising the price so as to induce greater discovery effort is not as great now as during the last war period when new discovery techniques and deeper drilling methods were new.

In 1936 the authors stated:

"Deeper drilling and geophysical exploration may be merely the means of rapid discovery and exploitation of the petroleum deposits remaining in areas already known to be petroliferous. In this case the chances for future discoveries have been reduced by those already made, and the unexpected flood of new production in the past few years may well indicate an early and stringent shortage instead of a continuing ample supply."

Venezuelan Production

The possibility of promptly reopening Venezuela's production and increasing it has been mentioned. This is obviously a question of adequate transportation and naval protection. The situation in Mexico, whose petroleum production passed its peak in 1921, offers little or no prospect of any substantial increased production in the immediate future. Although many petroleum geologists, familiar with Mexico are of the opinion that important fields may be developed in that country, the older fields have already yielded about 85 per cent of their ultimate probable production and since the expropriation of most of these properties, both field and refinery equipment has been allowed to deteriorate greatly. In Venezuela, on the other hand, both government and company policies have in the past been favorable to extensive petroleum development.

With respect to Judge Cole's recommendations as to securing oil from shale and coal, the writers are of the opinion that the need for such developments is not yet here, provided the transportation difficulties are largely overcome permitting importation to be resumed. None of these processes would be profitable at anything like present price levels. Also it would not be possible to develop the manufacture of any of these substitutes to any really helpful scale in time to alleviate our shortage during the probable duration of the present war. Knowledge of these processes has not changed materially since they were reviewed in 1936. The political skirmish over alcohol motor fuel has in the meantime subsided, and our manufacturing capacity for alcohol is already severely taxed to supply other essential war needs. The methods of alleviating a petroleum shortage by improved technology, the increased hydrogenation of oil residues and the manufacture of oil from coal and shale were discussed fully in the writers' 1936 article. Any such methods of alleviation evidently depend upon much higher price levels over a considerable period of time.

TABLE 1—Uses of Gas Oil and Fuel Oil in the United States
(In 1,000 bbl. of 42 gal. each)

	1926	1931	1936	1940
Railroads	72,217	58,150	61,727	68,098
Steamships	79,287	83,558	80,324	74,803
Gas and electric power plants	33,651	24,490	26,799	32,795
Heating oils	24,079	40,410	116,617	160,379

Fuel Oils and Motor Fuel

Unless adequate supplies of crude petroleum are promptly made available, either by restoring imports or new discoveries (which does not seem probable), the refining industry as well as many established uses of petroleum products face radical and extensive changes. Under present conditions gasoline - cracking operations have been curtailed by the Petroleum Administration for War to conserve fuel oil for essential uses. In 1936, on the basis of statistics for 1934, the authors stated that "our supply of motor fuel can be increased very little from our present crude supply by cracking without cutting into other important established uses" and that "without relief by importing more crude, a decrease of 12 per cent in the supply of average crude would require the diversion to cracking stock of an amount of gas oil and fuel oil equal to the combined amount now used as furnace oil by commercial and domestic heating, by the gas and electric industry plus all of the kerosene now produced. Or such a decrease in crude production, if compensated for by increased cracking, would require the diversion for cracking to gasoline, of more fuel oil than is now used by the United States Navy and all the steamships supplied by American fuel oil. . . . What would naturally happen, unless the situation were relieved by greater imports, would be a readjustment of prices all along the line."

The amount of fuel oil consumed for commercial and domestic heating, relative to other uses, is far less than is popularly believed. Such use was much encouraged, however, to assist in disposing of the overproduction of crude in the years 1926-36. But if the present production and oil-finding trends continue, unrelieved by imports, the conversion of oil heating to coal-burning installations will probably be dictated by price as well as government regulation.

The increase in the use of fuel-oil heating in recent years is shown in Table 1, giving statistics from the Bureau of Mines.

The question of an adequate supply of crude petroleum during the war is further complicated by the necessity of manufacturing enormous quantities of high-octane aviation fuel for the Allies' armed forces, an increased need for fuel oils, the manufacture of butadiene for synthetic rubber, toluene and other important special products. The extent and ways in which these questions enter into the problem are, of course, not matters for public discussion.

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Asphalt Specifications Revised by Institute

NEW YORK. — To conform with Recommendation 61 of the Petroleum Administrator for War, as approved by the War Production Board, limiting the number of asphalt grades, the Asphalt Institute has made the necessary changes in its various construction specifications and issued them in pamphlet form with the title, "Construction Series 67—Emergency Revisions of the Asphalt Institute Construction Specifications."

Copies are available, without charge, upon request to the Asphalt Institute, 801 Second Avenue, New York, N. Y.

Efficiency of Bradford Water Floods Can Be Greatly Increased

*by Harry M. Ryder**

The reasons why many floods fail to remove more than a small fraction of the recoverable oil are analyzed in this article. Improved methods of operation are also discussed in detail.

BRADFORD can add more than $100,000,000 to its future income from extra crude-oil production. To do this it will not be necessary to find more "Music Mountains." This extra money is now waiting in the known oil sands, in the form of extra oil which can be produced if given the proper opportunity, but which is now ordinarily left behind in the sand. It is merely a matter of forcing each acre to produce the last barrel of oil that can be lifted at a profit; not just that which comes as a result of any variety of drilling, shooting and pumping operation.

All of this is now proved practical, the result of engineering developments—not the machinery used, but on the oil sand itself. These developments are the result of the cooperation of many individuals and of 17 years of continuous research, some in the laboratory, but most of it in the field. It proves that the amount of oil produced from any particular acre may be large or small, depending on how that acre is treated.

The average property in the Bradford field is producing from 2,000 to 3,000 bbl. more oil per acre where it is being competently operated by the best practical engineering methods than that same sand is producing where it is operated by average field procedure, the best known not many years ago.

All that is necessary, therefore, to realize the extra $100,000,000 in the Bradford area is that all properties henceforth be developed and operated in accordance with the successful methods now used by the operators who are taking advantage of the currently proved engineering treatment.

*Petroleum engineer, Ryder-Scott Co., Bradford, Pa.

Causes of Loss

The principal unnecessary losses of oil have been caused because of:

1. Not utilizing all of the pay sand.
2. Flooding the sand too slowly to wash out all of the available oil.
3. Shooting very open and worthless sand so heavily that it takes most of the water supplied, leaving an en-

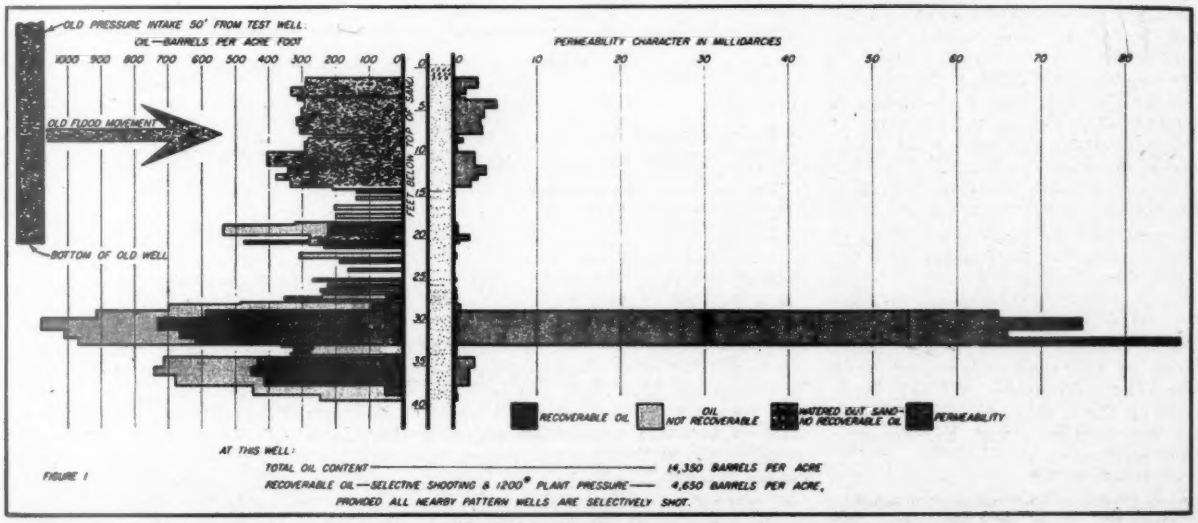

OLD PRESSURE INTAKE 50' FROM TEST WELL
OIL—BARRELS PER ACRE FOOT
1000 900 800 700 600 500 400 300 200 100 0
PERMEABILITY CHARACTER IN MILLIDARCIES
0 10 20 30 40 50 60 70 80
OLD FLOOD MOVEMENT
BOTTOM OF OLD WELL
FEET BELOW TOP OF SAND
0 5 10 15 20 25 30 35 40
RECOVERABLE OIL
OIL NOT RECOVERABLE
WATERED OUT SAND—NO RECOVERABLE OIL
PERMEABILITY
AT THIS WELL:
TOTAL OIL CONTENT—— 14,350 BARRELS PER ACRE
RECOVERABLE OIL—SELECTIVE SHOOTING & 1200# PLANT PRESSURE—— 4,650 BARRELS PER ACRE,
PROVIDED ALL NEARBY PATTERN WELLS ARE SELECTIVELY SHOT.
FIGURE 1

Fig. 1—How much recoverable oil may be left in the sand owing to inadequate penetration

tirely inadequate amount for the pay sand.

4. Providing too few or improperly placed intake wells.

5. Not providing proper back pressure for floods; that is, one-sided flooding.

6. Packing off pay sand.

7. Ignoring old water, known or unknown, already in the sand.

8. Unnecessarily trapping oil between floods, new or old, and between floods and the edges of sand layers.

There are many valid reasons why these conditions have existed. The outstanding one is found in the fact that water flooding in Bradford has been, and still is, a pioneering job. Pioneers always pay a heavy price for their work, and the pioneering of water flooding at Bradford is no exception to this rule. Very fortunately, on the whole, the natural richness of the Bradford sand has enabled Bradford men to survive this period of learning even though they have paid a price for their industry and initiative.

But because many facts, elusive for years, have finally been captured and put to work, much of the loss incurred by early, and until recently the best known, methods need not be suffered in future operations.

Let us review briefly some of the most serious of these losses.

1. Not operating all of the pay sand. There are two principal reasons for this: First, not knowing that some of the sand is present or believing it to be worthless; and, second, the avoidance of some very open sand, even though it may be prolific, because of difficulties in controlling floods through it.

The first of these is due to the fact that much of the lower part of the Bradford formation is badly broken and has, in the past, been drilled with long screws. If the lower 2 ft. of a screw happens to be drilled through all shale, the cuttings may show nothing but shale, even though several feet of pay may be present higher in the same screw. Where this has occurred, pay sand has been passed up without ever having been noticed.

An excellent example of the second reason is illustrated in Fig. 1. This well was drilled 50 ft. from a pressure intake which has been operated for years. The very open sand, at 30 ft., was known to be present and had been responsible for serious water handling difficulties nearby. To avoid this, the operator drilled his nearby intake well only 18 ft. into the sand. None of the sand below that depth was operated from this old intake well. In Fig. 1, all of the sand to which the nearby intake well had access, is now watered out.

But below the 18-ft. level. 11.8 ft. net of excellent pay sand occurs which at the test well now contains 4,600 bbl. of recoverable oil per acre (all of the sand now contains a total of 14,350 bbl. per acre). Yet this area was logically considered to be watered out for all practical purposes. As to the handling of the very open pay sand, we now know that all that is necessary is carefully to avoid shooting it. It will flood beautifully with no shot whatever opposite it.

2. Flooding the sand too slowly to wash out all of the available oil.— This is an outstanding cause of lower-than-necessary recoveries. The damage that slow-moving floods have caused in the past could not have been believed possible, except as the facts of the case were actually uncovered by the extended study of the amount of oil remaining in sand already watered out under a wide variety of known conditions. This study, in turn, could never have been made, had it not been for the privilege of studying the results of tests of large numbers of closely spaced wells drilled into sand through which flood water had previously passed under known conditions.

The oil actually produced is necessarily the difference between the amount of oil in the sand before the flood started and that remaining in the sand after it is watered out. Since most old floods have not watered out all of the sand, it is necessary to be able to determine just which layers are watered out. This is not always easy, but it is necessary and can be and is being done.

It has been found by studying many thousands of tests on individual watered-out sand layers that the oil remaining may occupy from 15 per cent to more than 50 per cent of the total available pore space. This means that in some sand the flood has removed about two-thirds of the oil present at the time the flood began, but that at other places the flood has not only removed no oil but has actually moved some extra oil in from elsewhere and has then covered that oil with water within the pores and "locked" all of it in place—a total loss.

This is due to a variation in the velocity with which the water moves through the sand. The difference in the amount of oil the water does not move, and therefore in the amount which is produced, is caused, in the Bradford sand, by the different flood velocities used by producers. In any sand layer, the faster the flood moves, up to some relatively high velocity, the more oil it drives from the sand, the more oil the producer sells from that sand, and the more favorable the resulting net income.

Table 1, from actual tests on watered-out sand, shows how differently, in terms of oil removed, various floods have performed in the Bradford field. Flood 1, with moderately heavy shooting and rather high pressure, removed almost 200 bbl. of oil per acre from each foot of sand. Flood 4, on the other hand, removed only 30 bbl. of oil per acre from each foot of much better sand. Flood 4 did less than one-sixth as good a job as Flood 1. The only difference was the speed of the flood.

Too slow flooding in Bradford means lost oil, absolutely and always. Every slow-moving flood means oil unnecessarily lost. Therefore, to eliminate this loss, floods must operate at "full speed." There is no other way.

Fig. 2 shows how much of all of the oil in the sand at the time the floods began, the floods of Table 1 actually removed. Flood 1 is good. Flood 4 is tragic, but there have been and now are many "Flood 4's" in the field. The fact that their owners may be convinced that the poor showing is due to poor sand doesn't alter the fact that in such cases it is due to very slow flooding of really good sand and that the producers are losing heavily because of it.

Any layer of sand anywhere in the Bradford field must be provided with

TABLE 1—Types of Bradford Floods

	Flood 1 Efficient	Flood 2 Inefficient	Flood 3 Very inefficient	Flood 4 Exceedingly inefficient
Source well sand face pressure, lb.	1,600	800	450	Irregular
Shot in source well	Moderately heavy	Unknown	Unknown	Unknown
Per cent of pay sand flooded	98	83	69	82
In the watered-out sand only:				
Before flooding:				
Approximate oil saturation, per cent	44.00	43.00	43.00	43.00
Oil content—bbl./acre-ft.	468	485	524	563
After flooding:				
Oil saturation—average, per cent	25.69	37.23	38.33	40.05
Oil content—bbl./acre-ft.	273	414	469	533
Oil removed by flood—bbl./acre-ft.	195	71	55	30
Oil originally removable by most efficient flood—bbl./acre-ft.	222	205	232	293
Oil lost by too slow flooding—bbl./acre-ft.	27	134	187	263
Flood efficiency (flooded sand)	87.8	34.7	23.7	10.3
All sand:				
Flood efficiency (realized per cent of most efficient recovery)	86.0	28.8	16.4	8.4
Oil actually removed by flood—bbl./acre	5,450	1,225	525	500
Per cent removed of all oil in formation when flood started	31.6	10.6	5.96	2.79
Oil unnecessarily lost—total bbl./acre	850	3,000	2,675	5,450

about 3 bbl. of water daily for each foot of its thickness, at each intake, and intakes must be properly placed. This does not mean that the well must average 3 bbl. of water per foot of sand. Forcing 10 or 15 bbl. of water daily into a very open streak does not help the tighter sand which may be taking a small fraction of a barrel a day, but merely wastes water.

Loss 3: Shooting open sands.—Only the tight sand just must be heavily shot and high pressure must be applied just to it if it is to take the proper amount of water to flood at its most efficient rate. If the open sand is also heavily shot, it can and often does take an unmanageable amount of water, causing bypassing or channeling. All that it is necessary to do to prevent this latter condition is to avoid too heavy shooting of the open sand, or to avoid shooting it at all. It can be done, it is being done, and it must be done if the producer is to sell the valuable oil from his tighter sand.

Loss 4: Providing too few or improperly placed input wells.—Water starvation is the biggest single cause of lost oil in Bradford. The only remedy is a sufficient number of properly placed intake wells, heavy shooting at the proper places, followed by sufficient pressure. Many producers would be money ahead by abandoning their almost watered-out wells and adding the available water to their better areas, always providing a sufficient number of intake wells. To operate with too little water is as unsatisfactory as pumping with too little gas. To operate with too few intakes is like trying to pump too many wells with one power. Neither is good operation or good business.

5, 6, 7, and 8: Other causes of loss.—To try to flood with water from one side only is just another form of water starvation, and always very expensive. Unnecessarily packing off pay sand is, of course, complete water starvation of such sand. To drill producing wells into sand already watered out is an entire waste of time, money and materials. Oil just cannot be driven through watered-out sand. This is all too common where wells are drilled according to a plan and regardless of old floods, known or unknown. It can almost always be avoided.

If, therefore, Bradford producers are to realize the extra $100,000,000, which they can do, they must flood all of the sand at their wells, they must flood it at as nearly the most efficient speed as possible, they must provide sufficient intake wells, and they must drill their producing wells into oil instead of into water. This is being done on some properties. It can be done on all properties.

But there are objections from many operators. Among these are:

1. Experience is considered to indicate that high pressure causes "bypassing" not found at low pressures.
2. All of the available oil is expected to be produced at some time, no matter what plan of development and operation is followed.
3. If a property has not produced satisfactorily, the sand is considered to be the only cause. The method has nothing to do with it.
4. A neighboring property or the producers own property has shown a profit with slow flooding, therefore slow flooding is satisfactory.
5. Production over many years is desired as income insurance. Full speed flooding is considered to water out the sand too rapidly.
6. Full speed flooding produces most of the oil during the first year. This is considered to result in an unbalanced income and in unnecessarily excessive taxes.

Let us examine these arguments. As to the fear of bypassing, only if the pressure is so high that the overburden is actually lifted, can true bypassing of the sand occur. At very few places will such bypassing occur if the pressure at the well head does not exceed 1 lb. for each foot of the well depth.

If really open sand has been shot too heavily, high pressure will move a large quantity of water through it. If in addition, old water has already moved through such sand, a very common condition, a considerable amount of water under this combination of circumstances may show up at the producing wells almost the same day that pressure is turned into the intake. This has often happened, and is all too often blamed on the pressure, whereas the true cause is the shooting of the already watered-out very open sand. To submit to this condition rather than to prevent it, and henceforth to use low pressure is to lose a large amount of oil which could have been produced and sold. This is all unnecessary. And over the life of the well the total amount of water produced for each barrel of oil sold is almost always lowest when the proper high pressure is used, regardless of casual observations apparently indicating the contrary.

Objections 2 and 3 add up to the fatalistic feeling that there is nothing to be done to improve production:

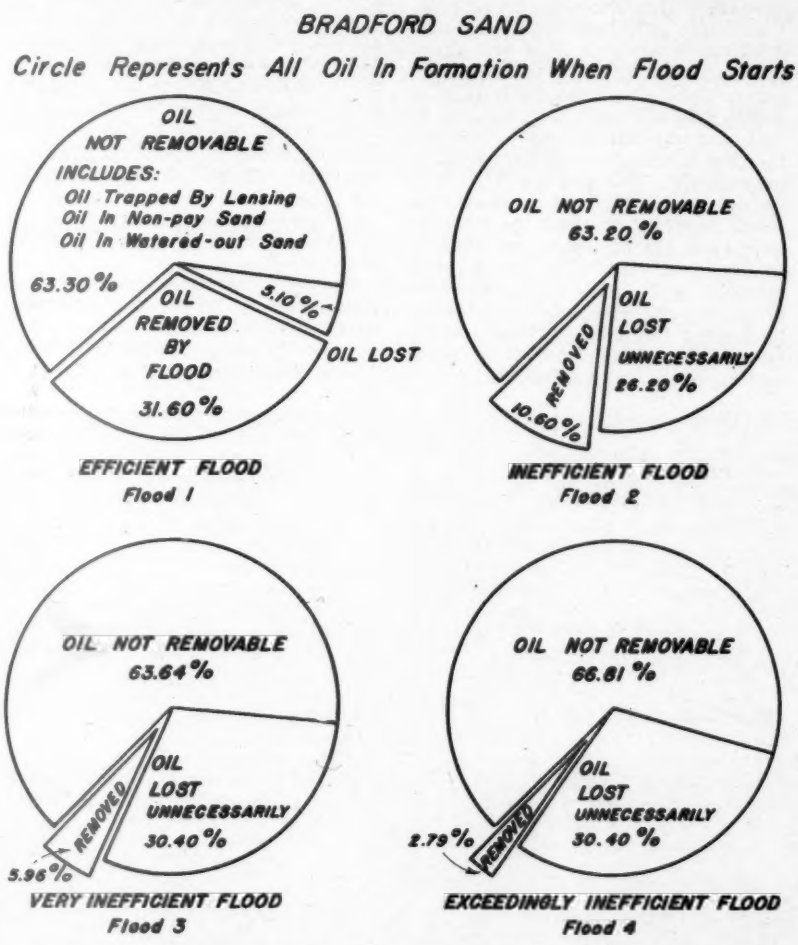


Fig. 2—Diagrammatic representation of recovery by efficient and inefficient floods

The wells are drilled, water is turned in, and the oil comes or it doesn't. That this simplified and perhaps comfortable way of life is expensive has been proved at many places. Why it is expensive and what is being done about it have been extensively discussed in this article and in other articles previously published by the writer.

Argument No. 4 is a direct result of the bounty of nature. Many properties have been naturally so rich that they have paid out regardless of the methods used. But because a producer has actually realized 4,000 or 5,000 bbl. of oil per acre or even more from some property does not mean that that property was not capable of producing a far greater amount. In many cases properties have proved to have been capable of producing twice the amount of oil actually sold. The simplified operation has been comfortable, but expensive, even though it showed a profit. Further it does not mean that the next property that operator chooses to flood will be so generous. There is no satisfaction in making money on one property, only to lose it on the next. This, too, has been done, and not always because the second property could not have paid out, but some times merely because the second property demanded a different treatment which it did not receive.

Arguments 5 and 6 both revolve around the fact that full speed flooding ordinarily brings to production half or more of all of the oil during the first year. This is true, and it is a necessary result of the most efficient flooding. But it does not necessarily shorten the life of the property, and it always leaves the operator with more money for his trouble, regardless of time.

In the first place, much of the extra oil produced during the first year or two of full speed flooding would never be produced if the flood moved slowly. That extra oil is all "velvet." It has cost very little and does leave some worthwhile additional profit even after possible heavy taxes. In some cases it provides the only profit.

If water is turned into an entire property at one time, with full speed flooding, half or more of all of the recoverable oil is usually produced during the first year, and the life of that property will be shorter than if the flood were permitted to move very slowly. This full speed in each separate sand layer throughout the whole property provides the most efficient of all flooding, and regardless of taxes it yields the greatest possible return in oil and profits. But unless the operator is in a position to turn water into a new property every year or two, it does result in a variable and short-time income.

The operator who wants a steady moderate income over as long a time as possible from one property is still able to do so and at the same time to operate his property efficiently. In fact with full speed flooding he produces so much more oil from each acre that it can enable him to produce any desired appropriate amount of oil daily over a much longer period of time than is possible by slow flooding.

To accomplish this, all that he needs to do is to develop fewer five-spots each year. In this manner, his total acreage will last longer, he will operate fewer wells at one time, but will produce as much oil daily as though he had worked a large area slowly. In short, full speed flooding enables him to produce whatever oil he desires daily within the capacity of his property, and with fewer and better wells. His income each year can be the same, but with full speed flooding it lasts for more years because a smaller area is producing at one time. At the same time his costs and work are much less. He makes a greater profit for each barrel of oil produced, for each year he operates his property and he continues to make that profit over more years.

To sum up the whole situation, vast improvements in flooding efficiency have been developed and have been extensively proved in the field. These

(Continued on Page 47)

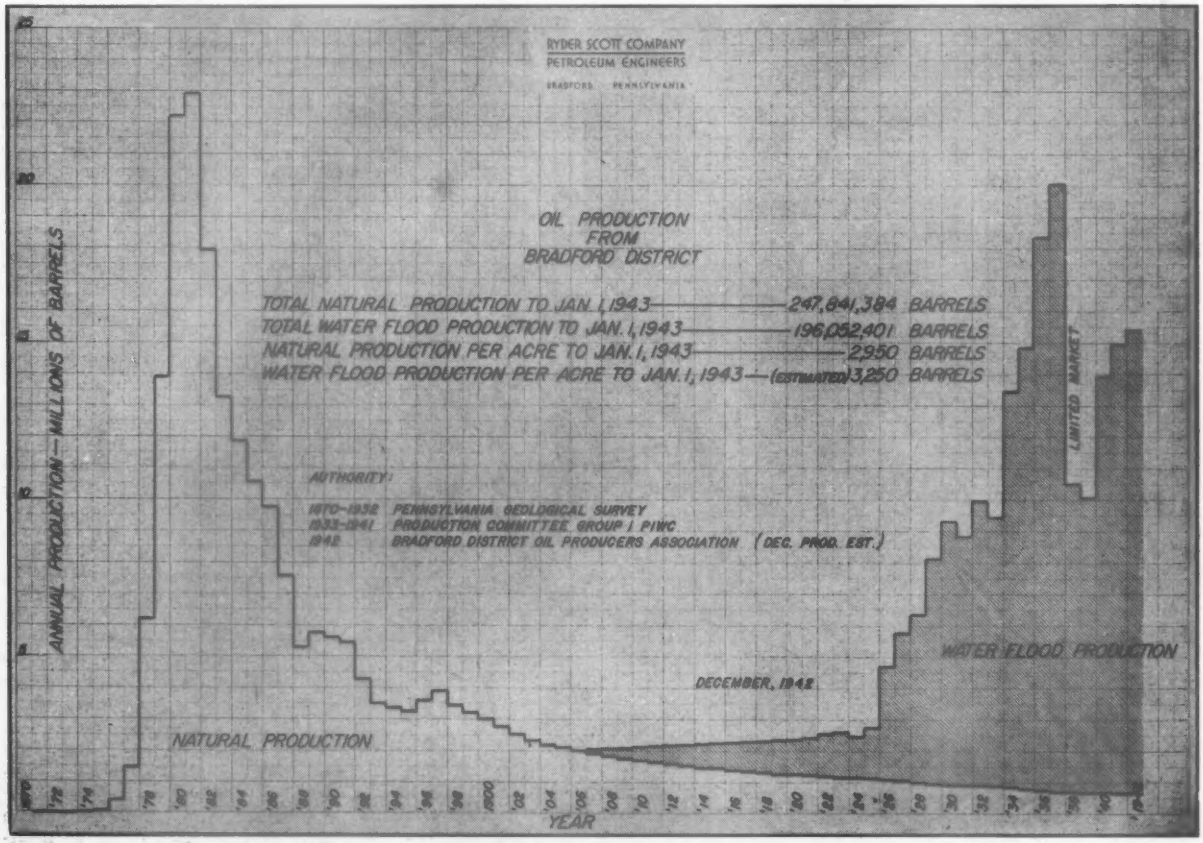
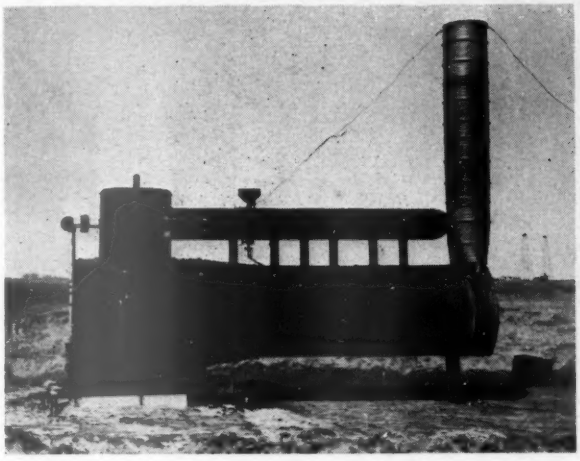

RYDER SCOTT COMPANY
PETROLEUM ENGINEERS
BRADFORD PENNSYLVANIA
OIL PRODUCTION FROM BRADFORD DISTRICT
TOTAL NATURAL PRODUCTION TO JAN. 1, 1943 — 247,841,384 BARRELS
TOTAL WATER FLOOD PRODUCTION TO JAN. 1, 1943 — 196,052,401 BARRELS
NATURAL PRODUCTION PER ACRE TO JAN. 1, 1943 — 2,950 BARRELS
WATER FLOOD PRODUCTION PER ACRE TO JAN. 1, 1943 — (ESTIMATED) 3,250 BARRELS
AUTHORITY:
1870-1932 PENNSYLVANIA GEOLOGICAL SURVEY
1933-1941 PRODUCTION COMMITTEE GROUP I PIWC
1942 BRADFORD DISTRICT OIL PRODUCERS ASSOCIATION (DEC. PROD. EST.)
ANNUAL PRODUCTION — MILLIONS OF BARRELS
NATURAL PRODUCTION
DECEMBER, 1942
WATER FLOOD PRODUCTION
LIMITED MARKET
YEAR

Fig. 3—Production record of the Bradford district showing additional oil recovered by flooding

OPERATING IDEAS



Old Boiler Used for Oil Heater

FOR an oil heater in treating operations, a Kansas producer makes use of a small, obsolete field-type boiler. It was equipped with an auxiliary heating chamber mounted on top for the oil. The shell of this was fabricated from a section of 10-in. pipe. This is supported horizontally on the boiler by a series of legs through which heat is transmitted from the boiler. A chemical injector is fitted on the side with connection to the oil stream. Note the flue constructed of old oil drums.

Pumping Engines Started by "High" Line Power

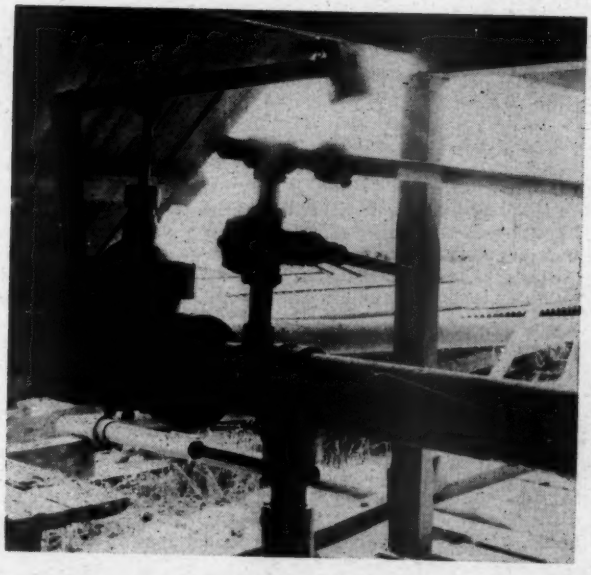
INSTEAD of using batteries an operator in the Oklahoma City field has arranged to start the engines of three large hydraulic pumping units with power direct from a nearby "high" line. The engines operate on magnetos. Use of the "high" line power gives instant starting and eliminates considerable maintenance work usually required by batteries. Here is shown the power-control box for the starter with engine house at right.

Unitized Rack for Oil Containers

MANY different small oil and grease cans and containers are used around a drilling rig. Unless special means is provided for keeping them in a central place these often become scattered and misplaced, particularly during moves. A unitized oil and grease-can rack is used by one major company. It contains special shelves and compartments for the different containers, which after using are always returned to their respective places. The unit is equipped with skids for easy moving.

Blowout Control Valves on Mud Line

DRILLING in high-gas-pressure areas on the Gulf Coast requires in many instances the provision of chokes and back-pressure valves on the mud return line to prevent blowouts. In this installation is shown a 2-in. choke line, into which various size chokes can be inserted, leading off the top of the main return line. When high pressures are encountered the returns can be diverted through this line by closing the main valve at the left. In normal operation this valve is held open by a chain which holds up the weight-controlled arm. The valve can be closed from the derrick floor by releasing the holding chain. The weighted arm holds the valve closed.



Equipment for applying concrete by Gunite method is carried on a truck and a semitrailer. Dry sand and cement are fed into mixer hopper at right. Engine and air compressor on truck at left provide air pressure for moving sand-cement mixture from gun to nozzle and for operating the duplex water pump

New Method of Applying Concrete —Saves Time and Material

Walls of salt-water-disposal pits in the East Texas field are being lined by spraying of cement. The procedure, described in this article, is expected to find increasing use in oil industry construction as its time and cost saving benefits become more generally known.

by Harry F. Simons

SEVERAL years ago the method of building houses by spraying cement on a form was introduced and advocated for low-cost housing. It was thought to have little application in the oil industry because most of the buildings used in the field must be readily portable. Recent months have shown that this method of erecting cement structures, known as "Gunite," has a very definite and quite wide application in the oil industry.

Its principal use at the present is for the construction of concrete salt-water pits used in conjunction with disposal projects. It also has been used for the protection of banks along canals and ditches and a possible application may be the lining of drilling-fluid pits on rotary rigs where difficulty is experienced with caving banks or thief sands near the ground surface. Spraying a layer of concrete on the sides and bottoms of the mud pits could be quickly accomplished at a fairly reasonable cost.

More Salt-Water Pits

The oil industry has already entered a salt-water-disposal era. Rather it should be said that it is in a salt-water injection phase and it may well enter a salt-water recycling stage. Such a program is being inaugurated in the East Texas field, and it is intended that ultimately all the water produced with the oil will be returned to the Woodbine formation from which it is produced. In certain types of formations and under favorable conditions, such as exist in East Texas, such projects will practically amount to an induced water drive with the reservoir pressure being maintained at or near its original level by water injection throughout the life of the pool.

Any salt-water system of any size will include gathering stations, or ponds, and a central treating plant. The type of plant used to remove impurities from the water before injection to prevent plugging of the formation varies with the locality, the chemical content of the water and the permeability of the disposal zone. Where the disposal zone does not take water easily, it must be almost completely free from impurities which may precipitate out. If the zone into which the water is being injected figuratively "drinks" the fluid, pretreatment need not be so complicated. The treatment being used by the East Texas Salt Water Disposal Co. consists of aeration and chlorination. Size of the aeration pit depends on the amount of fluid to be run into the injection well daily (from 6,000 to 12,000 bbl. daily) while the chlorination and skimming pits are much smaller, being about 14 to 14 ft. square and 6½ ft. deep, divided into two sections.

The aeration pit is built by either excavating, or excavating and building a retaining wall. The smaller pits are dug by hand. Both pits have sloping walls. These pits are permanent installations as the salt-water-disposal project will be in operation a considerable number of years. Originally salt-water-disposal pits were generally considered as temporary and simple earthen dikes or pits were used. Cement-lined pits have since been found to be the most feasible.

Normally the cement lining to such pits is placed by building a form and then mixing and pouring the concrete. Generally this amounts to an expenditure of a little over $1 per sq. ft. of finished concrete.

The pits in the East Texas salt-water-disposal project are being built by the Gunite or spray method which uses no forms, less material and time and costs about 40 per cent less. Fewer men, but more skilled, are required for the job.

In addition to eliminating forms for the concrete, less cement and sand are used to obtain a structure of the specified strength. Tests have shown that sand and cement mixed by normal methods has a compressive strength of about 3,500 lb. per sq. in. Gunite-applied cement shows a compressive strength of approximately 8,100 lb. per sq. in. Normally, on pits such as those being constructed in East Texas, the concrete used would be a little over 4 in. thick, but the denser concrete obtained by the Gunite method allows safe use of a thickness of 2¼ in. It is believed that the greater strength comes from the more intimate mixture of the cement, sand and water; in addition the air mixed in with the spray seems to have a beneficial effect.

The Gunite concrete also shows less expansion and contraction and consequently fewer expansion joints are needed. This reduction in expansion joints may be as much as 50 per cent, although on the pits in East Texas it amounts to about 30 per cent.

Time-Saving Feature

Some idea of the time-saving feature can be gained from the capacity of one unit which is the laying, or more properly spraying, of 10,000 sq. ft. of 2¼-in. concrete per day. Thus a pit 150 by 180 ft. by 7 ft. would require approximately 3 days to spray with one unit.

In building the salt-water pits, sleepers of 3 by 12-in. concrete, of either Gunite or mixed concrete are run in trenches. The expansion joints are placed over these sleepers. While the concrete in the sleepers is setting, the reinforcing wire is cut and laid on the sides of the pit and the bottom. When spraying of the cement starts, the reinforcing wire is held away from the ground by a helper using a stick, and a layer of concrete approximately 1¼ in. placed by the Gunite method. The wire is then allowed to lay in the concrete already placed while the remainder of the slab is sprayed. Gage sticks are used to tell the operator when the required thickness of concrete has been obtained.

The surface can then either be finished with a trowel like any other concrete or it can be left rough. In salt-water pits there is no necessity for a smooth finish and the concrete is left just as placed.

Equipment for doing the work is comparatively simple, although experienced operators are necessary. The equipment being used on one job in East Texas consisted of a cement mixer for intimate contacting of the dry cement and sand, a 420-cu. ft./min. at 60 lb./sq. in. compressor, driven by a 100-hp. internal-combustion engine, a 3 by 3-in. duplex pump operated by compressed air, the gun, hoses and spraying nozzle. About 15 men are required on a crew.

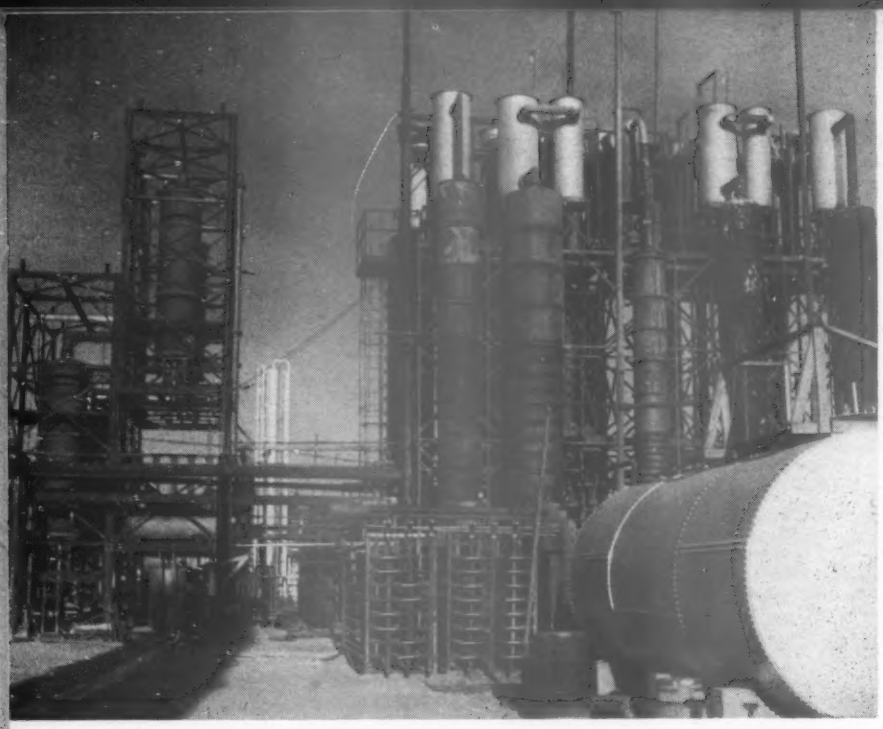
The sand and cement after being mixed go into the two-chamber gun from which it is forced out by air through the hose to the nozzle at about 60 lb. per sq. in. Water is delivered to the nozzle at 150 lb. per sq. in. where an injector effect is employed. The two-chamber gun operates on a bellows principle.

One of the incidental requirements for speedy spraying by the Gunite method is dry and clean sand, the latter being a prime requisite for good concrete by any method. Dry sand is handled more readily by the gun than is wet sand; in fact, a moistureless sand will speed up the placing of the cement 25 per cent. In the field, moisture is removed by piling the sand on top of a heating chamber made from old oil drums, or pipe, in which a gas fire is burned.

The method is ideal for repairing concrete work as the new material can simply be sprayed on. For instance, in increasing the capacity of concrete pillars, the new material is sprayed on until the members have the desired size to support the load.

In case anyone is interested in a house after the war, a five-room number can be sprayed on a rubber form in 1½ days. If you have any color preference, the finish layer can be pigmented any hue desired.

Top: Nearing the finish of a salt-water-disposal pit in the East Texas field constructed by Gunite method. Large hose delivers sand-cement from gun (man with right hand on lever) to nozzle at 60 lb. pressure. Small hose carries water at 150 lb. Man with stick holds wire up while man handling nozzle places concrete under it. Wire in left foreground has already had half of the 2¼-in. of concrete placed under it and balance will be added later. Note smooth contours at corners and top of pit. Bottom: Nozzle crew consists of man handling nozzle, a helper holding the hose and a second helper supporting the wire while the preliminary layer of concrete is placed under it. The method is ideal for repairing



General view of Cities Service's Tallant, Okla., plant for controlled oxidation of hydrocarbons to produce alcohols, aldehydes, ketones. In the columns methyl (wood) alcohol and formaldehyde are separated by distillation

Chemicals, Solvents by Natural-Gas Oxidation

by R. J. Daugherty*

THE large-scale production of chemicals by the direct oxidation of natural-gas hydrocarbons at the Cities Service Oil Co. plant at Tallant, Okla., represents another step in the expansion of the petroleum industry into the field of chemical manufacture.

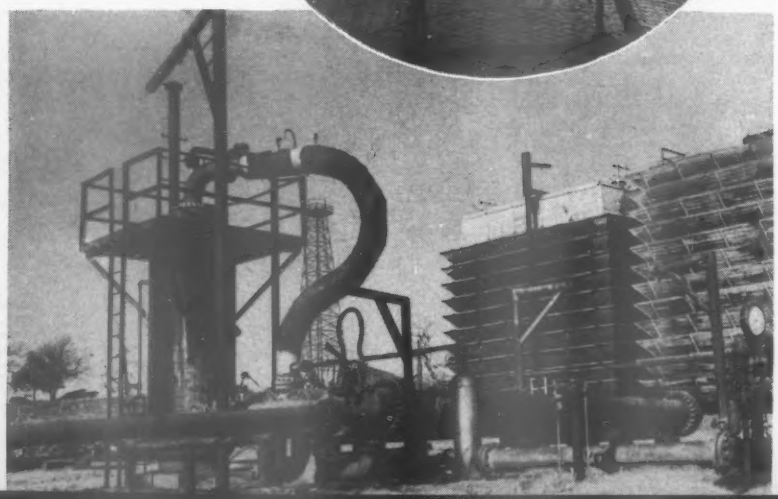
*Cities Service Oil Co.

Methane, ethane, and other hydrocarbons from natural gas are now being converted by partial oxidation to methanol (methyl alcohol), formaldehyde, acetaldehyde, methyl acetone solvents and allied compounds at the Tallant plant. The controlled air-oxidation process operates at moderate temperatures and pressures, eliminating the use of heavy forgings and scarce materals necessary in synthetic processes operating at higher temperatures and pressures.

Cities Service is the pioneer producer of formaldehyde by the partial air-oxidation method, developing the process in its own research department. The Tallant plant was built in 1928. Subsequent expansion of facilities and capacities places the company at the top of the list as the largest producer of formaldehyde by this process.

Methanol and formaldehyde are produced in approximately equal quantities, together with smaller quantities of acetaldehyde and methyl acetone solvents. Produced as an admixture, the crude chemical is separated into its major constituents by fractionation. Further refining is necessary to bring the chemicals to commercial and U. S. P. specifications.

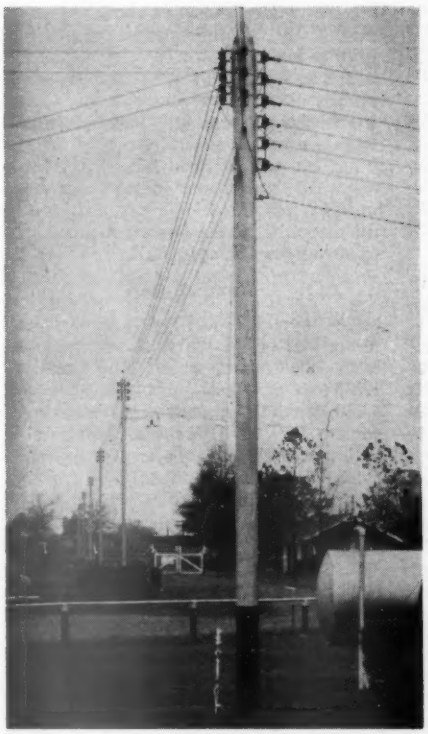
Left: Methanol and solvent rectifying columns. Below: Converter for oxidation of natural-gas hydrocarbons. Right: Acetaldehyde rectifying column



Dairy Compressors for Oil Laboratory

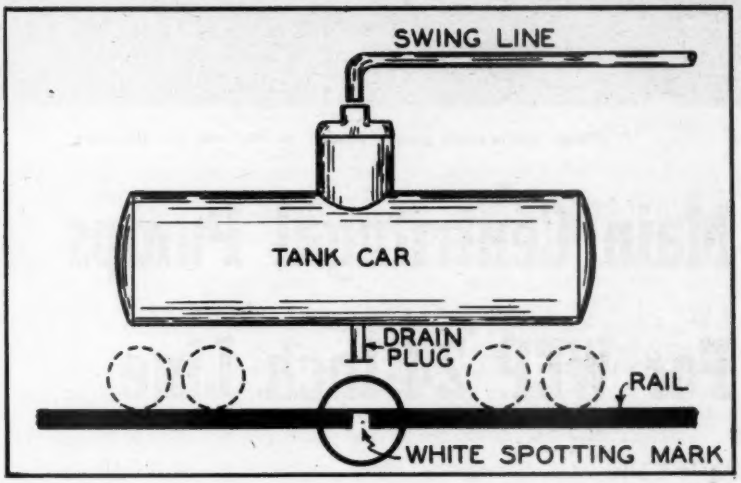
AS part of the construction of the new automotive laboratories of Continental Oil Co. at Ponca City, Okla., two used ammonia compressors which had formerly been used in a dairy refrigeration system, were rebuilt by Carson Machine Works and installed to supply refrigeration to the laboratory.

PLANT PRACTICES



Reclaimed Pipe Used for Transmission-Line Poles

RECLAIMED and reconditioned pipe of large diameter proved useful to a Louisiana company as poles in a plant-transmission line. The upper end of the pipes were closed by fishtailing and welding to keep out moisture. Brackets were welded on and insulators were bolted directly thereto, completing the pole ready for line attachment.

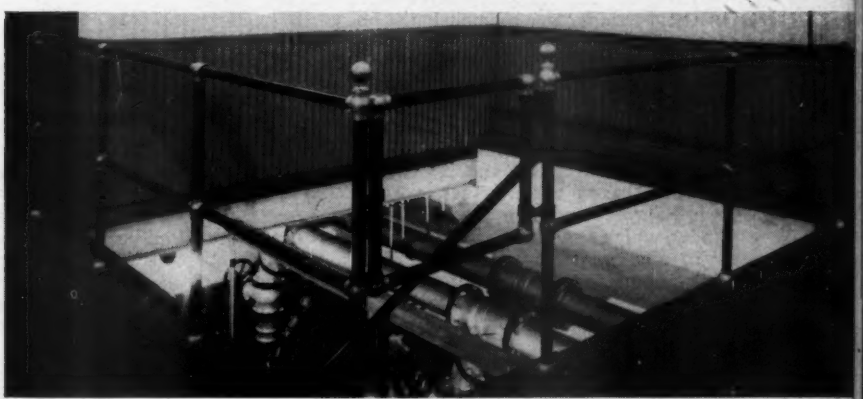


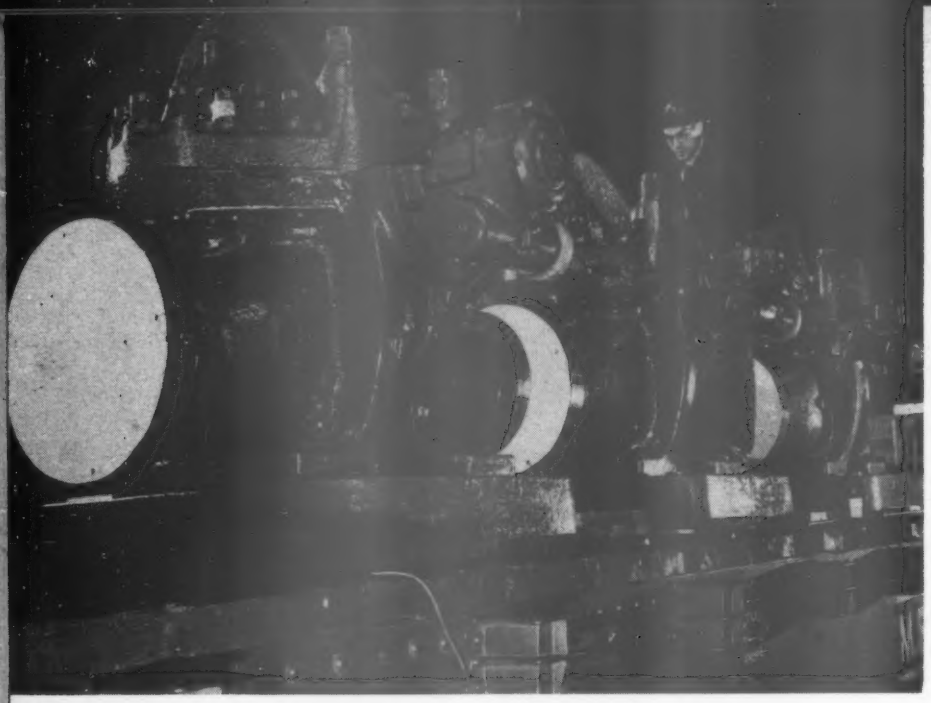
Spotting Tank Cars at Loading Rack

A SIMPLE method of helping trainmen spot tank cars at the exact spot desired is that employed in at least one refinery. A white stripe is painted on the web and flange of the rail and so placed that when the drawoff line on the tank-car bottom is in line with this white stripe the dome is at the exact spot required for connecting the line to load or unload the car. Both trainmen and loading-rack operators appreciate this trick as a time and temper saver.

Safety Gates Eliminate Falling Into Pump Pit

TO eliminate any chance of a workman falling into the pump pit in pump houses, the gates set in the railing around the sublevel pits are arranged so that they open only outward; a stop in the form of a semi-circular strap is fixed on the inside of the gatepost.





Three single-stage pumps loaded on flat car for shipment

Main Centrifugal Pumps For WEP 24-Inch Line

In designing pumps for the three-stage installations for moving 300,000 bbl. daily through the Texas to New York - Philadelphia crude-oil pipe line there have been a number of important departures from usual practices which are described here.

by Paul Reed

SINCE the War Emergency Pipelines, Inc., 24-in. line must handle more than five times as much oil as would be moved through the largest type of single-line trunk system now employed in the United States, the special features of design of the WEP main-line centrifugal pumps are attracting attention of the industry.

The pump stations of the WEP line, it is believed, will have the highest over-all efficiency of any in the world. A number of aspects of station and transmission-line design were discussed in articles appearing in the January 7 issue: "Electric Installations," by W. H. Stueve, page 65; "Stations," page 69; and "Electric Motors for the War Emergency Pipe Line," by W. G. Taylor, page 74.

Some of the conspicuous features of these pumps may be mentioned before entering into the discussion. Pump speed is low compared with that of other centrifugal pumps in pipe-line service. To conserve steel a policy was adopted of using cast iron for castings, bed plates and impellers. In the designing of stuffing boxes, measures were taken which are appropriate for meeting the conditions under which the pumps will function.

To meet requirements of the WEP line, pumps were designed for stations which would handle 300,000 bbl. of oil per day operating at a discharge pressure of 707 lb. However, due to their location, some stations were designed for slightly lower pressures.

The pumping equipment in each station consists of three 16-in. by 12-in. single-stage pumps in series, each rated at 8,750 g.p.m., or 300,000 bbl. daily against a head of 630 ft., or 229 lb. per sq. in. at a speed of 1,780 r.p.m., each pump being driven by a separate 1,500-hp. motor.

Two manufacturers, Allis-Chalmers Manufacturing Co. and Ingersoll-Rand Co., were awarded contracts for the pumps. Both companies completely standardized all mounting dimensions so that the pumps of either manufacturer are interchangeable on their baseplates, but each manufacturer adopted his own design of the detail parts.

Reasons for Single Stage

The decision to use three single-stage pumps in series was due to several considerations.

1. Higher efficiency could be obtained with this arrangement than with the conventional arrangement of multistage pumps in parallel. The pumps are arranged so that the flow from one into the other is in a straight line, thus keeping to a minimum the loss between successive stages. The curved return bend of multistage pumps is one of the main factors in making their efficiency lower than single-stage pumps.

2. Quicker delivery could be obtained by the use of single-stage pumps even though complete new design and pattern development was required.

3. The cost of the single-stage pumps was materially lower than would have been the cost of multistage pumps.

4. The use of three 1,500-hp. motors permitted standard motors to be used instead of the very special motor that would have been required for 4,500 hp. in a single unit.

Pump Speed

The speed of 1,780 r.p.m. was selected after a careful comparison with 3,500-r.p.m. speed. The speed of 1,780 r.p.m. gives a specific speed of 1,340, which according to standards set up by the Hydraulic Institute is satisfactory for the operation with a flooded suction. Actually the minimum suction pressure will be 20 lb. per sq. in. However, under emergency conditions there is no question but what the pumps will be satisfactory for operation at lower suction pressures. For pumps of this high capacity a speed of 3,500 r.p.m. would have required considerably more pressure on the suction.

The 1,750-r.p.m. speed also gives opportunity for a somewhat better stuffing-box design because of the large-diameter shaft involved.

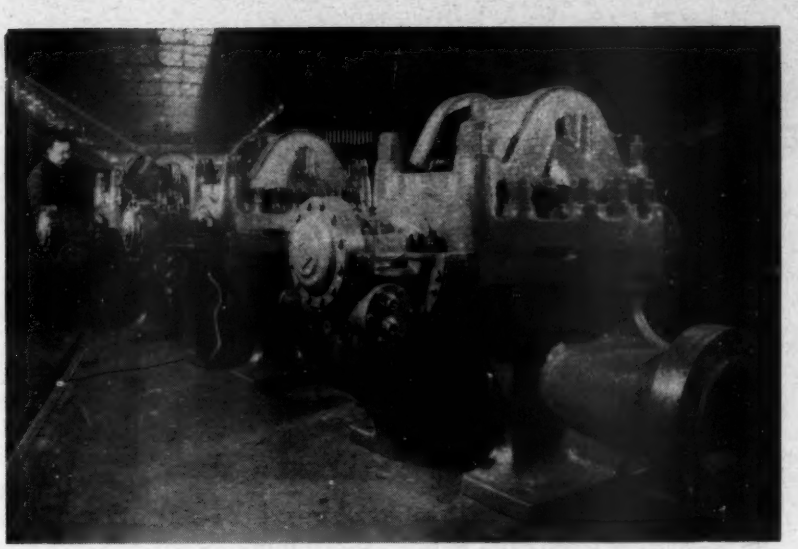
The lower speed also made it possible to provide a unit with a lower over-all cost because the lower motor cost at 1,780 r.p.m. more than offset the higher cost of a pump operating at this speed in a unit of this size.

The details of design were worked out individually by the two pump manufacturers, since standardization was carried only to the point of over-all mounting dimensions. Both manufacturers selected horizontally split-casing, double-suction pumps with

ring oiled sleeve bearings and double-row ball-thrust bearing. The same ball-thrust bearing was adopted in order to reduce the number of spare parts.

The design of the casing for 1,160-lb. test pressure offered many problems inasmuch as it was decided to use high-test cast-iron casings in order to conserve steel. This meant very heavy ribbing and very careful stress analysis in order to insure a rigid design. The hydraulic design of the casing had to be very carefully worked out to avoid radial unbalance which might occur at such high heads, and to secure the highest possible efficiency.

High-test cast iron was also selected for the impellers and careful stress analysis and design was required to keep within safe limits of centrifugal stress. Impellers were given special heat treatments to relieve casting and machining strains.



Three pumps completed on schedule time on the assembly floor of Allis-Chalmers Manufacturing Co. shops

Stuffing-Box Design

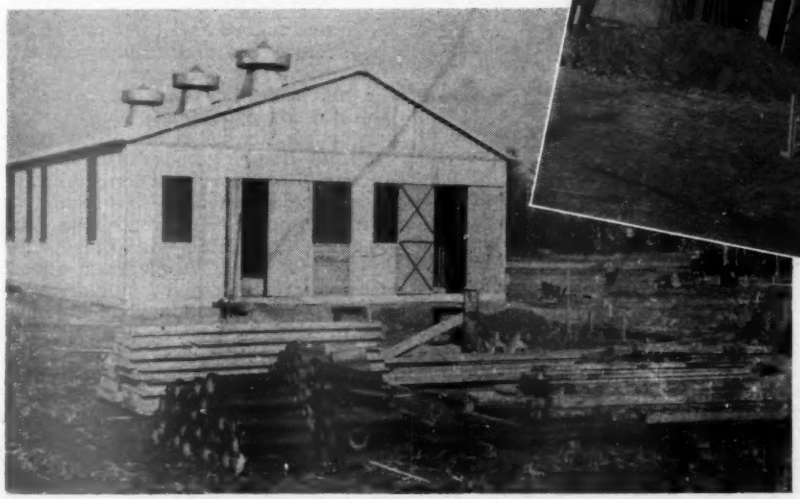
Because of the high suction pressure on the stuffing boxes of the second and third pumps in series the design of the stuffing box is quite special. They are arranged with a long close-clearance-reducing bushing and a leak-off connection to bleed back the leakage of the second and third pumps into the main line ahead of the first pump, thus maintaining a pressure of approximately 20 lb. per sq. in. on the packing of all three pumps. By careful design of this leak-off feature it was possible to reduce leakage so that the small loss in power is probably considerably less than would have occurred, due to stuffing-box friction, if it had been decided to pack against the full pressure. Furthermore the life on both the packing and sleeves will be much greater with the design selected.

The casing-wearing-rings and the stuffing-box bushings are made of bearing bronze; shaft sleeves and casing-wearing rings were made of hardened stainless steel. These two materials run well together and reduce the possibility of seizure at close clearances.

The weight of these detail parts, which required scarce material was kept at a minimum. The pumps as a whole contain only a very small proportion of materials which are difficult to get owing to the demands of war industries.

The pumps are driven by separate motors coupled with fast flexible couplings. The motor-shaft extension is sufficiently long to extend through a fire-wall stuffing box, provided by the pump manufacturer. The design of these stuffing boxes was also standardized for mounting purposes. The stuffing boxes are split so that the motors can readily be removed for maintenance and repairs. The baseplates of cast iron are of uniform design with extra large drain pockets which are piped to the pump.

Right: Pump station at the Longview, Tex., terminal. When both photographs were taken, pumps and motors were installed on foundations



Left: Station 5, near Little Rock, Ark., while it was in the early stages of construction

Effect of Composition and Rank Of Coal Upon HYDROGENATION*

Investigation of the hydrogenation of coal is continuing with a view to the day when coal reserves will be called on to supply oil because of dwindling liquid-petroleum supplies. Under proper economic conditions petroleum products can be supplied from domestic coals for many centuries.

THE conversion of coal into motor fuels by hydrogenation has become very important in the last two decades to countries possessing small or dwindling reserves of oil. The technique of liquefying coal has received much attention, and the quantity of coal converted into liquid fuels is steadily increasing. Coal hydrogenation is similar to other forms of coal utilization in that among the major factors involved are the nature and properties of the coal. Success in choosing the best coal is most important. The yield of oil is increased, the yield of inert residue is decreased, operating difficulties and maintenance costs are minimized, and the capital investment and cost per gallon of the product are lowered by using coal of optimum properties. Some coals apparently cannot be liquefied under any reasonable conditions, certainly not under conditions that would encourage commercial exploitation. As there are numerous types and ranks of coal, it is highl desirable to have some method of differentiating between coals that may be suitable for hydrogenation and those that are thoroughly unsuitable. Since the selection of coals by hydrogenation tests in an experimental plant is expensive and time consuming, any simple analytica method for indicating the highly unsuitable coals would be eminently worthwhile. With such a method, the coals designated as suitable or as borderline cases could be tested further by hydrogenation in small bombs. The coals passing the small-bomb tests would then be assayed in an experimental plant (continuous hydrogenation), as some of the engineering aspects and operating difficulties cannot be evaluated or predicted at present by hydrogenation tests in small bombs.

Because of the failure of previous investigators to correlate hydrogenation characteristics adequately with other properties of coal the relation between the petrographic composition of coals of different rank and their hydrogenation behavior was investigated. The data obtained in the hydrogenation of about 130 samples of pure constituents of coal or coals of known petrographic composition show that some of the constituents differ enormously in ease of liquefaction and yield of the various products. These differences and the effect of rank on the liquefaction yield (100 minus the percentage of acetone-insoluble residue equals the percentage of liquefaction) are summarized briefly in the following paragraphs.

*This is a digest of portions of Bureau of Mines Technical Paper 642, Hydrogenation and Liquefaction of Coal. Part 2—Effect of Petrographic Composition and Rank of Coal, by C. H. Fisher, C. C. Sprunk, A. Eisner, H. J. O'Donnell, L. Clarke, and H. H. Storch. Part 1 of this series was published as Bureau of Mines Technical Paper 622 and consisted of a review of the literature, description of experimental plant, and liquid-phase assays of some typical coals.

Readily Hydrogenated

All the constituents of coal that are translucent in thin sections under the microscope are readily hydrogenated and give a high liquefaction yield. The translucent constituents, which include spores, resins, oil algae, woody debris, and anthraxylon (vitrain), usually contain less than 91 per cent carbon (moisture and ash-free basis) and comprise the greater part of bituminous and lower rank coals. The rapid decrease in the translucence of coal with increase in carbon content may be used as an index of rank. All constituents in coal of high rank (carbon content greater than about 91 per cent) are so opaque that it is difficult to make sections thin enough to transmit light The liquefaction of spores, resins, and oil algae, which proceeds most readily, can be effected even under conditions that are unsuitable for liquefying the other translucent constituents.

The products obtained by the hydrogenation of spores, resins, and oil algae are oils of low density that contain a high proportion of saturated hydrocarbons. Products from anthraxylon, the principal constituent of most coals (especially those used abroad for commercial hydrogenation), apparently contain higher percentages of phenols and aromatic hydrocarbons than products from spores, resins, and oil algae.

The opaque constituents, which usually contain more than about 90 per cent carbon (moisture and ash-free basis) are difficult to liquefy. Probably the opacity and difficulty of liquefaction of the opaque matter are directly proportional to the carbon content. Although the content of opaque constituents varies considerably and is high in some splint and cannel coals, the proportion of inert opaque matter in most coals is low.

Opaque attritus, the characteristic constituent of splint coal, varies considerably in opacity and carbon content; and, as might be expected from these differences, the liquefaction yield also varies over a wide range. Borderline material that is only slightly opaque but is classified as opaque attritus by microscopic examination may give a liquefaction yield as high as 85 per cent of the moisture and ash-free coal; however, a yield as low as 40 per cent is obtained with attritus of a high degree of opacity. The average liquefaction yield for opaque attritus indicated in the present work is about 60 per cent. The liquefaction yield for samples of opaque attritus can be increased by increasing the hydrogen pressure; the additional material liquefied is that with the lowest degree of opacity and lowest carbon content (semiopaque attritus and "brown matter").

Fusinite Inert to Hydrogenation

In bituminous and lower rank coals the constituent that usually has the highest degree of opacity and the highest carbon content is fusain. This constituent, which resembles charcoal in appearance, is a mixture of very opaque fibers, called "fusinite" and about 10 to 30 per cent translucent or semiopaque material. The fusinite is virtually inert to hydrogenation. The material associated with the opaque fibers is partly, sometimes almost completely, liquefied by hydrogenation. The liquefaction yield obtained with fusain, which depends primarily on the quantity and nature of the translucent fraction, usually ranges from 5 to 25 per cent.

As may be concluded from the foregoing discussion, bright coals, which contain high percentages of anthraxylon and translucent material and

Fig. 1—Typical lump of bright coal from No. 6 bed, Franklin County, Illinois

constitute the greater part of the nation's coal reserves, usually are suitable for hydrogenation. As all bright coals are relatively homogeneous in that they consist mainly of anthraxylon and translucent attritus with only minor quantities of other petrographic constituents and differ chiefly in degree of coalification, their chemical properties are readily correlated with suitable indexes of rank, such as carbon content. The liquefaction yield obtained upon hydrogenation of bright coals containing less than about 10 per cent total opaque matter is related to the carbon content. A high liquefaction yield is obtained with bright coals having less than about 98 per cent carbon. The yield of oil decreases and that of water and carbon dioxide increases with a decrease in the carbon content of the bright coal hydrogenated.

In contrast with bright coals, splint and cannel coals are highly heterogeneous in that they contain significant quantities of a variety of petrographic constituents; therefore, their carbon content, volatile-matter content, and other characteristics are only averages for all the constituents. Upon the basis of carbon content and opacity, the constituents of splint coals differ enormously in rank. For example, the translucent woody matter may correspond to subbituminous or high-volatile bituminous coal in rank, whereas the opaque attritus may be similar in rank to low-volatile bituminous coal or semianthracite. Accordingly, the commonly used indexes of rank are not very significant and cannot be employed with confidence to correlate the chemical properties of these coals. Owing to the fact that the presence of considerable opaque matter is indicated by the proximate and ultimate analyses, however, the carbon content sometimes can be used as a measure of the content of opaque matter and therefore of the approximate degree of liquefaction to be expected. As a class, splint coals are less suitable for hydrogenation than bright coals.

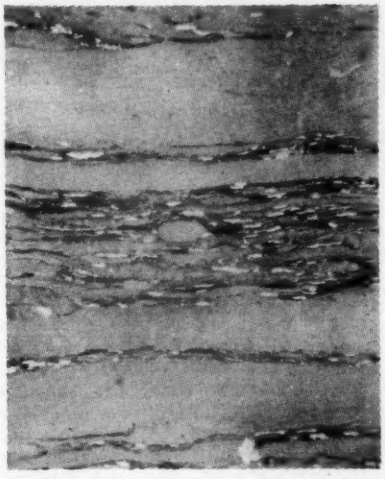


Fig. 2—Thin section of bright coal, illustrating anthraxy bands separated by translucent attritus

Petrographic Types of Coal

Fieldner and coworkers defined coals according to type as (1) bright; (2) semisplint; (3) splint; (4) cannel, and (5) boghead. The first three types, which usually contain bands or streaks of anthraxylon visible to the naked eye, are called banded coals; cannel and bogheads are nonbanded coals. These types of coal are defined in terms of relative quantity and nature of anthraxylon and attritus in Table 1.

The bright coals comprise the greater part of the nation's coal reserves and sometimes are referred to as "common banded coals." In the lump (Fig. 1) numerous anthraxylon bands can usually be detected, and in thin sections (Fig. 2) the anthraxylon bands are seen to be separated by translucent attritus. The attritus may consist of any of the constituents previously mentioned, such as leaves, spores, resins, cuticles, and translucent degradation matter. The attritus influences the chemical analyses to some extent, but as the bright coals usually contain about 40 to 70 per cent anthraxylon they are often regarded as not differing greatly in ultimate and proximate analyses (ash content excepted) from pure anthraxylon. The bright coals of lignite and subbituminous rank are not as brilliant or glossy as those of bituminous rank, but for want of a better name the term is retained for low-rank coal of this type.

Splint and Semisplint Coals

Important splint coals occur in West Virginia and Kentucky, particularly in the beds of the Upper Pottsville formation. The splint coals from this region have long been known as excellent steam and domestic fuels. Commonly they have a dull luster, grayish-black color, and compact structure. They are hard and tough and break with an irregular, rough, sometimes splintery fracture into large lumps and slabs (Fig. 3) that stand handling and transportation remarkably well.

The splint coals are easily identified in thin sections under the microscope. They are characterized by a semiopaque to opaque ground mass or attritus, as in Fig. 4, whereas the bright-coal sections have a ground mass or attritus that is predominantly translucent. If the content of opaque attritus ranges from 20 to 30 per cent, the coal is classified as semisplint; coals containing more than 30 per cent opaque attritus are splint coals.

Cannel and Boghead Coals

Cannel coals are clean, compact, block coals of massive structure and uniform, fine-grained texture. Usually they are dark gray to black, have a greasy luster, and have a noticeably conchoidal or shell-like fracture. A typical cannel coal (Fig. 5) has no visible sign of banding, therefore it is

TABLE 1—Description of Types of Coal

Type of coal	Relative quantity of anthraxylon and attritus	Nature of attritus	Structure of coal
Bright	Anthraxylon predominating to attritus predominating.	Translucent attritus predominating; opaque attritus present.	Banded; bright luster.
Semisplint	Anthraxylon and attritus in more or less equal proportions.	Translucent attritus and opaque attritus in about equal proportions.	Compact; finely banded.
Splint	Attritus predominating.	Opaque attritus predominating; translucent attritus (especially spores) present.	Banded; compact; hard; irregular fracture; dull luster.
Cannel	Almost all attritus.	Translucent attritus (often spores) to opaque attritus predominating.	Compact; hard; conchoidal fracture; dull luster; nonbanded.
Boghead	Almost all attritus.	Translucent attritus (oil algae) predominating; opaque attritus present.	Compact; hard; conchoidal fracture; dull luster; nonbanded.

classed as a nonbanded coal. Thin sections under the microscope reveal that cannel coals are composed almost entirely of attritus or microdebris, with very few bands of anthraxylon. The microdebris may comprise a wide variety of components, such as spores and pollens, anthraxylon fragments, oil algae, and opaque constituents. The preponderance of one or two constituents usually determines the type.

Fig. 3—Typical lump of splint coal from Dorothy bed, Kanawha County, West Virginia

Virtually all high-volatile and high-hydrogen cannel coals contain numerous spores and are called spore cannels. Boghead cannels have similar chemical properties, but they differ microscopically in having an appreciable quantity of oil algae in addition to the spores and other constituents of a normal cannel coal. If the oil algae increases in quantity until they form nearly all of the ground mass, the coal is known as a true boghead coal. The chemical analysis of a typical boghead coal shows a hydrogen content ranging from 9 to 11 per cent and a volatile content between 75 and 90 per cent (dry, ash-free basis). Because of their high content of volatile matter, spore and boghead cannel coals were used extensively at one time for the manufacture of "coal oil" and the enrichment of coal gas.

Definition of Types in Terms of Percentage of Constituents

Although coals are conveniently classified according to type as bright, semisplint, splint, cannel, and boghead, these terms are not adequate for correlation with hydrogenation properties. As soon as it became evident that opaque constituents were primarily responsible for low liquefaction yields, much attention was given to the quantitative determination of opaque attritus and fusain. For example, a bright coal with 2 per cent opaque attritus and no fusain gave considerably less organic residue than a bright coal with 15 per cent opaque attritus and 5 per cent fusain. Likewise, a splint with few spores gave a larger yield of residue than one containing many spores. In other words, coals of the same type sometimes differ considerably in hydrogenation characteristics; therefore it was necessary to resolve the types into percentage of anthraxylon, translucent attritus, opaque attritus, and fusain to obtain data from which to predict behavior upon hydrogenation. Such predictions are only rough approximations at present; the degree of opacity of the attritus must be measured before predictions can be accurate.

Fig. 4—Cross-section showing opaque ground mass of splint coals

Table 2 summarizes the samples hydrogenated. The anthraxylons were selected from coals ranging in rank from peat to anthracite. Most of the bright coals were from the western Cretaceous and Tertiary coals, and nearly all the splints, fusains, and cannel coals were selected from Pennsylvanian age coals from the eastern half of the United States. The coal fields of the United States may be considered in two divisions with respect to age. Fig. 6 shows that the coals of Pennsylvanian age usually occur in the eastern half of the United States and the younger Cretaceous and Tertiary coals in the Gulf Coast region and western half of the country.

Fig. 5—View showing blocky structure, conchoidal fracture, and nonbanded appearance of cannel coal

TABLE 2
Summary of Samples Hydrogenated

	Number hydrogenated
Anthraxylons	41
Bright coals	47
Splins and semisplints	13
Cannels and cannel bogheads	13
Fusains	8
Miscellaneous samples	7

Considerable attention was given to the hydrogenation characteristics of the young western coals because of the large tonnage available for future use. It is not generally known

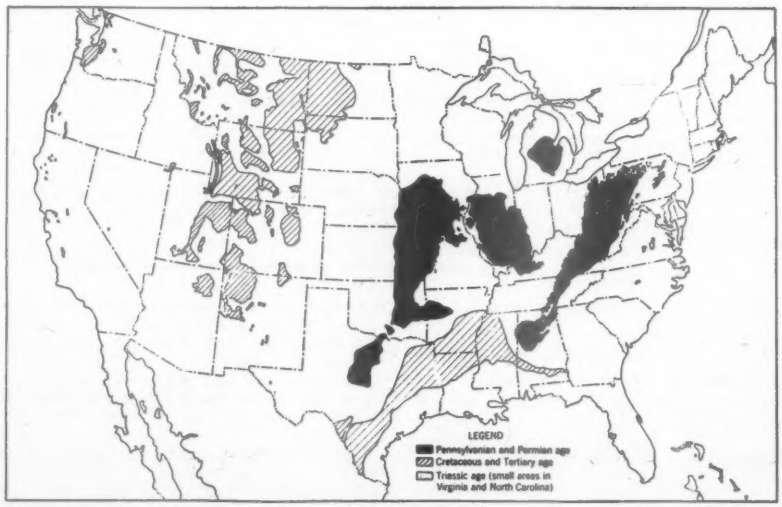

LEGEND
Pennsylvanian and Permian age
Cretaceous and Tertiary age
Triassic age (small areas in Virginia and North Carolina)

Fig. 6—Coal-bearing areas of the United States (after Geological Survey)

New Weapons from Petroleum

In the oil industry well directed research is always looking to the future It never sleeps

Every present success achieved suggests and gives direction to study and discovery along new lines—to still greater successes

Universal pioneered in the production of super-gasoline by thermal cracking It did not stop there While its Dubbscracking process was at its height, world-famous chemists were brought to Universal and under their leadership a broad research program was started in a field new to petroleum refining—Catalysis That research has produced world-important results

Catalytic processes were developed which are the key to our vast and growing production of fighting aviation gasoline Out of those patient years of research also came processes which produce the components of synthetic rubber—freeing us forever from dependence on rubber trees 10,000 miles from home

Those processes are available to every refiner under license from Universal

It's lucky for Uncle Sam and our allies that petroleum research did not rest on its oars

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that the coals of Cretaceous and Tertiary age constitute about two-thirds of the total tonnage in the United States (coal reserves of Alaska not considered). Campbell stated:

> Most people think of the eastern part of the United States as the greatest repository of coal in the country, and therefore they may be surprised to find that there are two areas in the West that contain a greater quantity. The greatest quantity of coal originally contained in any single area of continuous coal-bearing rocks in 1,202,032,000,000 tons, in the Fort Union region of Montana, Wyoming, and the Dakotas; the second is 665,649,000,000 tons, in the Green River region of Wyoming; and the third is 550,898,000,000 tons, in the Appalachian region of the East.

The Pennsylvanian age coals have furnished approximately 95 per cent of the total production of the United States. Industry has turned to the older coals because they are near the great trade centers and generally are higher in rank and better adapted to meeting the present high standards for fuel.

The quantity of opaque attritus and fusain in the two groups of coals is particularly interesting because it has been shown that these two constituents are difficult to liquefy by hydrogenation. Some western coals were found to be exceptionally free from opaque constituents. However, the majority have about the same quantity of opaque attritus plus fusain (5 to 15 per cent) as the coals from the Allegheny and Monongahela formation of the Appalachian region, such as the Pittsburgh, upper and lower Freeport, and upper and lower Kittanning beds. Of all the western coals examined to date, only two beds contained a large proportion of opaque constituents like the splinty coals of the upper Pottsville group of West Virginia and Kentucky.

Effect of Rank Upon Hydrogenation of Anthraxylons and Bright Coals

It has long been recognized that the rank of coal is of great importance in the preparation of liquid fuels by hydrogenation, and several studies have been made of this variable. In most studies, however, the petrographic composition of the samples was unknown, and the effect of petrography and type of coal, which are now realized to be profound, was ignored. Consequently, for some coals, the influence of rank probably was partly obscured by differences in petrographic composition, therefore the results of some of these studies are difficult to interpret. In the present investigation the results were obtained with petrographically homogeneous samples that can be used to demonstrate the effect of rank upon coal hydrogenation. Anthraxylon (vitrain), the principal constituent of most coals, was selected for the study of rank because of its availability and the fact that it is characteristic of bright coal, the type used in commercial hydrogenation. The samples of anthraxylon ranged in rank from peat to anthracite (carbon content, 55.5 to 94.9 per cent). Cellulose, wood, and lignin, the progenitors of coal and important constituents of peat and brown coal, also were hydrogenated. The results obtained with anthraxylons and bright coals are shown in Tables 3 and 4.

Hydrogenation of Semisplint and Splint Coals

Description and Analysis of Samples

Banded coals containing 30 per cent or more of opaque attritus are classified as splint coals. Coals with a content of opaque attritus between that of bright coal (under 20 per cent) and splint coal (over 30 per cent) are des-

TABLE 3—Experimental Conditions and Liquefaction Data for Hydrogenation of Anthraxylons

(Hydrogenation period 3 hours. Initial H_2 pressure 1,000 lb. per sq. in. Temp. 430° C.)

Experiment No., state, and county—	Products, grams: Liquids plus solids	Products, grams: Gases	Loss, grams	Centrifuged oil, grams	Liquefaction per cent[1]	H_2 consumption, per cent[1]
1B (Cotton)	174.6	18.7	9.5	150.6	96.6	1.86
4 Wisconsin, Manitowoc	169.2	22.3	11.9	133.1	96.3	2.56
5B Washington, King	174.1	15.1	15.8	136.9	93.3	4.08
8 North Dakota, Mercer	162.4	12.1	28.9	122.1	94.4	2.78
10A Washington, Lewis-Cowlitz	182.8	12.3	9.0	113.5	88.5	3.26
11A Washington, King	179.2	12.4	11.8	78	79.2	2.48
13A Wyoming, Sheridan	182	14.4	7.7	127.5	89.2	3.24
17 Colorado, Weld	184.5	9.6	9.9	151.2	94.4	3.72
18A Washington, Whatcom	182.3	10.3	11.1	135.2	92.7	2.95
22 Ohio, Harrison	185.4	7.2	11.6	156.5	98.1	3.37
24 Illinois, Franklin	188.8	11.2	5.1	162.1	97.3	4.55
25 Pennsylvania, Washington.	188.1	7.8	9.0	....	98.3	4.13
26 Pennsylvania, Clarion	183.1	....	....	160.5	98.5	3.86
28 Pennsylvania, Allegheny	189.4	....	....	166.3	97.8	...
29 Pennsylvania, Westmoreland	190	....	....	168.3	98.2	...
30 Pennsylvania, Armstrong	187	7.2	10.4	165	98.0	3.69
31 Kentucky, Pike	188.6	5.5	10.8	155.4	95.8	4.06
32 Pennsylvania, Westmoreland	188.3	8.4	5.6	171	97.2	1.33
34 Pennsylvania, Fayette	187.8	6.5	9.0	....	92.9	2.42
35A Pennsylvania, Cambria	181.6	5.8	17.4	121.4	79.5	3.78

[1]Percentage of moisture and ash-free coal.

TABLE 4—Experimental Conditions and Liquefaction Data for Hydrogenation of Bright Coals

Experiment No., state, and county or bed—	Products, grams: Liquids plus solids	Products, grams: Gases	Loss, grams	Centrifuged oil, grams	Liquefaction per cent[1]	H_2 consumption, per cent[1]
43 Washington, King	173.8	21.2	8.8	129.4	96.8	3.1
44 North Dakota, Mercer	179.9	13.9	9.5	109.1	85.7	2.3
53 Washington, Lewis	178.0	12.5	13.0	95.7	94.4	3.3
56A Washington, King	184.8	8.1	10.4	103.9	89.4	2.9
58A Wyoming, Sheridan	178.0	15.7	10.1	132.7	87.7	3.1
64A Colorado, Weld	180.2	14.5	8.8	145.1	83.6	2.7
65 Utah, Lower Sunnyside	183.4	7.8	11.9	110.0	90.0	3.1
83 Illinois, No. 6	184.9	4.8	13.5	141.6	93.3	3.64
84 Kentucky, High Splint	182.8	9.3	10.8	146.8	93.0	1.91
85 Kentucky, High Splint	182.8	8.9	11.8	138.7	90.4	2.37
86B Pennsylvania, Pittsburgh.	184.3	8.9	10.7	....	92.5	2.89
87A Alabama, Mary Lee	187.0	....	....	125.7	89.2	...

[1]Percentage of moisture and ash-free coal.

TABLE 5—Experimental Conditions and Liquefaction Data for Hydrogenation of Semisplint and Splint Coals

(Hydrogenation time was 3 hours in all experiments)

Experiment No., state, and county—	Products, grams: Liquids plus solids	Products, grams: Gases	Loss, grams	Centrifuged oil, grams	Liquefaction per cent[1]	H_2 consumption, per cent[1]
90 Kentucky, Johnson	189.8	5.9	15.6	121.0	86.7	3.75
91 West Virginia, Boone	187.1	6.5	11.4	115.0	81.8	4.15
92A Kentucky, Harlan	187.3	7.6	7.6	87.4	59.8	2.08
93 Pennsylvania, Allegheny	192.1	3.9	7.4	132.2	85.6	2.94
94 Kentucky, Letcher	187.2	6.9	9.9	109.7	79.7	3.10
95 West Virginia, Mingo	188 8	7.4	8.2	116.0	82.9	3.68
96A West Virginia, Kanawha.	189.8	6.7	7.6	96.7	74.4	3.42
98 West Virginia, Mingo	185.6	6.5	12.7	111.0	77.2	4.04
100 Kentucky, Pike	189.3	5.6	8.9	105.0	75.7	3.01
101 Virginia, Buchanan	190.2	5.1	8.5	89.7	65.2	3.33
102A West Virginia, Wyoming	189.5	5.8	7.7	82.8	57.5	4.86

[1]Percentage of moisture and ash-free coal.

ignated as semisplints. The data in Table 5 were obtained by the hydrogenation of semisplint and splint coals. Some of these coals are highly heterogeneous. Pure opaque attritus, the characteristic constituent of splint coals, is difficult to separate, therefore its chemical and hydrogenation characteristics could not be determined by a study of pure samples. The properties of opaque attritus were determined by hydrogenating splints that contained 60 to 80 per cent of this constituent. Splint coals often contain appreciable quantities of translucent degradation matter, resins, spores, and oil algae. The hydrogenation experiments made with these substances show that resins, spores, and oil algae are liquefied readily and with high yields.

Prediction of Hydrogenation Yield From Analytical Data

The results of the work done by the Bureau of Mines can be used to predict the hydrogenation yield when analytical data that represent both the rank and type of coal are available. Although the method is not as accurate as could be desired, it is at least adequate for rejecting highly unsuitable coals. The carbon content of the coal substance and the petrographic composition were used in the present work to indicate rank and type, respectively, but probably other data could be used for the same purpose. For example, the content of fixed carbon or oxygen could be used to denote rank, and oxidation rates might be employed to estimate the quantity of inert (fusainized fibers) and relatively inert (opaque attritus) material present. The prediction of hydrogenation yield from the proximate, ultimate, and petrographic analyses of the coal, mentioned earlier in this report, is discussed further and summarized in the following paragraphs.

There is a rough correlation between carbon content and yield within the petrographic groups. For example, when splint coals alone are compared, the carbon content can be used to obtain a rough estimate of the yield. Moreover, there is a rough correlation between the content of carbon and of opaque attritus in the splint samples. Fusains and anthraxylons of the same carbon content (about 90 per cent) should give liquefaction yields near 20 and 90 per cent, respectively. Smaller but important differences in yield would be expected from anthraxylon and splint coals of equal carbon content.

A petrographic method of predicting liquefaction yield was compared with the frequently used method based upon carbon content alone. The yield of residue was estimated by assuming that the different constituents would give the following percentage yields: Ash and fusain, 100; opaque attritus, 38; and all other constituents, 0. Although far from satisfactory, the correlation of predicted and experimentally determined yields is interesting, and the method is superior to methods that depend only on carbon content and similar indexes of rank. When coals of one type only are used, however, the correlation between carbon content and hydrogenation yield is as good as that with petrographic composition.

A more complicated scheme of predicting yields probably would be better for some coals. For example, the fact that most fusains are about 15 per cent liquefied should be considered with coals of high fusain content. Upon the basis of the high liquefaction yield obtained with the fusain from Wyoming coal, the fusain in younger coals should give liquefaction yields similar to those obtained with opaque attritus. When most of the opaque attritus is semiopaque or brown matter, it should be assumed that the yield of residue will be 20 to 25 per cent instead of 40 per cent, the approximate average value. If the opaque attritus is known from microscopic examination to have an unusually high degree of opacity, only about 40 per cent of the opaque attritus should be liquefied under conditions similar to those used in the present work; however, the simple petrographic method appears adequate for rejecting coals that are unsuitable for liquefaction by hydrogenation.

Although attention has been centered on correlating the yield of residue (from which the liquefaction yield is calculated) and the nature of the coal, the data obtained by the Bureau of Mines show that the yields of oil, pitch, total gas, carbon dioxide, and water also can be predicted roughly from proximate, ultimate, and petrographic analyses. The yields can be predicted best for bright coals, which usually are the most suitable type for hydrogenation.

Bradford Water Floods

(Continued from Page 32)

improvements are not patented. They are available to all producers, to the advantage of everyone and to the disadvantage of none. Applied henceforth throughout the Bradford area, they can add more than $100,000,000 to the community income during the remaining life of the field. They can extend that life by years. Even now these improvements are adding thousands of barrels daily to the Bradford field production.

It is necessary to add that these improvements are a real community achievement. No one person can claim the credit. Messrs. L. G. Lent and D. T. Andrus pioneered the useful development of the chip sampling procedure, without which this work would not be practical. D. T. May and his associates have done an outstanding job in ironing out wrinkles in forcing the insignificant appearing chips to tell a remarkable story. Especially are they responsible for the correlation procedure without which the laboratory tests could not be translated into the most efficient operating methods.

The Smith-Newton Oil Co., the first operators to "take a chance" on an entire property; for this reason, because of their valuable suggestions and because of their whole-hearted cooperation, have a large part in this development. Their daily individual well gages of both oil and water production provided the first incontrovertible evidence of the achievements of efficient operation. Since then many other operators have added important contributions to this outstanding evolution in flooding and have, wherever sufficient oil was available, taken a corresponding well-earned profit.

Interpretation of things seen in the field and in the laboratory has tied the whole technology together. To this, M. M. Stephens, and again Mr. May, and their associates have all made important contributions. The shooting companies, all of them, have cooperated generously in making selective shooting a truly practical procedure. Their shooters, to a man, have done a remarkable job in the accurate placement of shots, to the advantage of the community.

Pennsylvania State College, through numerous tests and experiments, and especially through its development of the now universal method of permeability measurement, has added to the whole.

And finally, David Scott, Jr., has kept all of us within bounds. His has been the difficult task of maintaining the whole evolution on a thoroughly practical level. He has delicately but firmly sidetracked interesting but impractical ideas from whatever source to the end that the improvements may be real and practical.

Modern water-flooding procedure is truly a community product of Bradford, worked out in Bradford for the benefit of Bradford, but destined to be of inestimable value wherever water naturally or artificially drives oil through sand.

BOOK REVIEW

LIST OF AMERICAN STANDARDS FOR 1942. American Standards Association, 20 West Thirty-ninth Street, New York.

More than 550 American standards are listed, of which 71 represent new and revised standards approved since the last issue of the list. There is a separate heading for American War Standards, standards developed especially for the war effort. Another section is devoted to American Safety Standards. The list is free.

How To CAPITALIZE Your WATER COOLING COSTS

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3. High Efficiency, Light Weight, Non-Corrosive Monel Fans. Pritchard fans are the heart of Pritchard tower efficiency and economy. Their superior design and construction saves tremendous amounts of horse power over a period of years. Blades have a special twist and taper that gives a steady, uniform air flow through the entire fan opening.

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Further details on request. Write for them.

On the basis of 1¢ per kilowat hour, 24 hours per day, 250 days per year, the cost of operating a mechanical draft tower for 5 years is $300 per horsepower. Add to this the cost of your tower and you have your total 5-year cost, exclusive of upkeep.

Pritchard welcomes and urges this method of purchase because almost invariably Pritchard towers capitalize out at lower cost.

There are several reasons why—the most important of which are described in the column to the left. Read these reasons carefully. File them for future reference if you will. And be sure to get definite cost capitalization figures from Pritchard—and from any others you may choose—on the next mechanical draft tower you buy.

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PRITCHARD
Atmospheric and Mechanical Draft
WATER COOLING TOWERS

SAVINGS WITH WELDED CASING

SAVINGS incidental to running welded-joined pipe instead of threaded-and-coupled pipe for casing in oil wells include reduced bit and cement costs. These are in addition to the saving of approximately 10 per cent on the cost of the welded pipe against that of threaded and coupled. These costs are appreciable and a reduction of any size in either will affect the total investment required to drill and complete the well. The reduction in cement costs will be discussed here.

The design of a casing program and the size of the hole drilled is not simple and no general rules can be laid down. In some areas it is advisable to drill a large hole and allow a clearance of 3 or 4 in. between the borehole wall and the pipe. In extremely competent formations this clearance could be reduced to 0.750 safely. Generally, however, it may be said that in the larger sizes of pipe (9⅝ up to 13⅜ in.) the clearance between the wall hole and the pipe will run from 1.5 to 3.5 in. and may go even more. For the medium sizes (around 7-in. pipe), the clearance will run from 0.8 to 2.25 and for the small sizes the minimum is 0.5 in. with 2 in. being the maximum.

The clearances above are those between the pipe collars and bore hole and not the outside diameter of the pipe. When preparing to run threaded-and-coupled pipe in a hole, one looks at the maximum outside diameter of the pipe collars. It will be seen at a glance at any pipe-specification table that the thickness of the pipe collars is graduated downward as the size of the pipe is reduced. Collars for 13⅜-in. pipe add approximately 1 in. to the effective diameter of the pipe, and consequently add 1 in. to the diameter of the hole drilled to accommodate it. On the other end of the scale the 5-in. pipe collars add approximately 0.6 in. to the diameter.

Unfortunately as the differences in annular space are reduced as the smaller strings of pipe are used, the length of the column increases. It takes a little over 100 per cent more cement to fill the annulus between 10¾-in. pipe in a 15-in. hole than it does to do the same job for the same size pipe in a 12½-in. hole; and it takes about 86 per cent more cement to fill the annulus between 5½-in. pipe and a 7¼-in. hole than it does when using the same pipe in a 6½-in. hole.

The amount of cement used in a well is dictated by the height of the annulus filled and is not a set arbitrary volume. For instance, surface pipe is generally protected by circulating the cement, i.e., filling all the annulus. Oil strings may be circulated but on the other hand they may be protected by a specified number of feet of cement behind the pipe.

Here it can be stated that many operators have been using much heavier pipe than necessary for surface strings. Major savings can be effected by careful selection of pipe to use the lightest weight possible consistent with good practice. With cement to the top there is little danger of collapse, and even when cementing, the collapse factor is only the difference in weight between the cement behind the pipe and the mud on the inside.

A common pattern used is 10¾-in. surface pipe, an intermediate string of 7⅝-in. and an oil string of 5-in. For example, the surface string may be run to 400 ft., the intermediate string to 3,200 ft. and the oil string to 4,800.

Running of the above sizes of pipe in the threaded-and-coupled type would require the drilling of a 13¾-in. to 15¼-in. hole with 15-in. being the most common in which 10¾-in. pipe is run. Minimum hole size for the 7⅝ would be 9½-in., which is almost the maximum obtainable, the drifted internal diameter of the 10¾-in. pipe being 9.980 in. The smallest hole in which 5-in. pipe is run is 6¼ in. with 6½ or 6¾ in. being the more common. Here again the maximum size which can be run is 6¾ in.

The above clearances are for the lightest weights of the various sizes of pipe. Heavier weights in each size would have a smaller internal diameter and would provide less bit clearance for the drilling of the hole after that particular size of pipe was run.

Running of the same casing pattern in welded pipe would require 12¼ to 13¾-in. surface hole, 8½ to 9¾-in. hole for the intermediate string, and 5½ to 6¾-in. for the oil string. Hole sizes used to provide the same approximate clearance as that allowed for threaded-and-coupled pipe would be 13¾ in., 8½ and 6¼. The comparison is shown in Table 1.

From tables in the Drilling Equipment Directory (Section F, p. 35) it will be found that one sack of cement set (1.20) will fill the number of feet shown in the respective annular spaces. Table 2.

In actual practice, more cement would be used to allow for the filling of cavities, the same numerical difference in the amount of cement would exist because the welded pipe could be run in a smaller hole.

(Note: "Welded pipe" as used in this article is plain-end pipe with a bevel for welding. Other types of welded pipe would show a saving proportional to the amount the joints or collars were reduced.)

TABLE 1—Comparison of Hole Size for Threaded-and-Coupled Type and Welded-Type Oil-Well Casing

	Casing I.D.	Max. O.D.	Nominal size	Hole size	Clearance
Surface pipe, threaded and coupled	9.980	11.867	10.750	15.00	3.133
Welded	9.980	10.750	10.750	13.75	3.000
Intermediate string, threaded and coupled	6.844	8.585	7.625	9.50	0.915
Welded	6.844	7.625	7.625	8.50	0.875
				8.75	1.125
Oil string, threaded and coupled	4.369	5.619	5.000	6.75	1.131
Welded	4.369	5.000	5.000	6.25	1.250

TABLE 2—Feet Annulus Filled by One Sack of Cement

Hole size	Pipe size	Feet filled by 1 sack cement	No. ft.	Sacks required*	Price per sack†		Cost	
15	10¾	2.53	400	180	$0.775	$0.663	$139.50	$119.34
13¾	10¾	2.99	400	154	0.775	0.663	119.35	102.10
9½	7⅝	7.08	2,800	430	0.775	0.663	333.25	285.09
8¾	7⅝	12.90	2,800	247	0.775	0.663	191.42	163.76
6¾	5	10.70	1,600	180	0.775	0.663	139.50	119.34
6¼	5	15.60	1,600	133	0.775	0.663	103.07	88.17
Total cost cement using threaded-and-coupled pipe							712.25	523.77
Total cost using welded pipe							413.84	354.03
Difference							298.41	169.74

*Sacks required includes cement left in pipe to prevent contamination, reasonable allowance for cement around shoe and to fill approximately 100 ft. between successive strings.

†First price is for cement in bags at Odessa, Tex. Second price is for cement in bulk at same point. Premium grades cost $0.125 more per sack.

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Engineering Fundamentals No. 65

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

CALCULATION OF GAS ANALYSIS FROM SLOW-COMBUSTION DATA

THE calculations of the percentages of the various components in a natural gas is based upon the combustion equations given in Installment 60 of this series and upon the data recorded in carrying out the procedure described in Installment 64.

In the case of carbon dioxide, oxygen and carbon monoxide, which are removed by absorption, the volume of any one of these components is represented by the reduction in volume of the sample which occurs in the particular absorption pipette. The percentage by volume of any one of these three components is calculated by dividing its volume by the volume of the original sample and multiplying by 100. If the volume of the original sample is 100 cc., then the percentage by volume of any one component is numerically equal to the reduction in volume (in cubic centimeters) that occurs in the absorption pipette for that component.

When hydrocarbons are burned in the combustion pipette oxygen is consumed, and carbon dioxide and water are formed. As a result of such a reaction the volume of the products of the combustion will be less than the volume of the original sample of gas and oxygen that entered into the reaction. This reduction in volume due to the burning will be called the first contraction and will be designated as C_1.

Referring to the combustion equation for methane (Equation 1, Installment 60), it can be seen that one volume of CH_4 will unite with two volumes of O_2 to form one volume of CO_2. Since the water vapor condenses, its volume can be neglected. So, a total of three volumes of gas forms one volume of gas. Then for each volume of CH_4 present in the mixture burned, the contraction in volume will be two volumes. In a similar manner it can be seen from Equation 2 of Installment 60 that the contraction in volume will be 2.5 volumes for each volume of C_2H_6 gas in the mixture burned.

Now, assuming that one is dealing with a natural gas which contains methane and ethane, let

x = volume of methane present in mixture burned

y = volume of ethane present in mixture burned

C_1 = contraction in volume due to burning the mixture containing the two hydrocarbons.

Then,

$$C_1 = 2x + 2.5y \qquad (1)$$

The second contraction in volume, which occurs after the burning, is caused by absorption of the CO_2 formed by combustion as discussed in Installment 65, and will be designated as C_2. An examination of the combustion equations of Installment 60 will show that

$$C_2 = x + 2y \qquad (2)$$

Where x and y have the same values as assigned in Equation 1 above.

From the data taken on the test C_1 and C_2 will be known. Then, by algebraic solution of Equations 1 and 2 simultaneously the relative quantities of the two hydrocarbons present in the original gas can be calculated.

An analysis of a natural-gas sample will now be illustrated.

Example

Problem.—The following data were taken with a slow combustion apparatus:

	Cc.
Vol. of original gas sample	100
Vol. after absorbing CO_2	96
Vol. after absorbing O_2	94
Vol. after absorbing CO	94
Vol. of residue used for combustion	30
Vol. of O_2 used for combustion	100
Vol. of products after combustion	73.5
Vol. after absorbing CO_2 formed	40.5

Calculate the volumetric analysis of the natural gas used in the test.

Solution.—The volume per cent of CO_2 in the sample can be obtained directly, and is (100—96), or 4 per cent.

Similarly, the per cent of O_2 in the sample is (96 — 94), or 2 per cent.

Since there was no reduction in volume due to absorption in the CO pipette, there is no indication of CO in the sample.

Now, it can be seen from the data that

$C_1 = (100 + 30) - 73.5 = 56.5$ cc.

It is also evident that

$C_2 = 73.5 - 40.5 = 33.0$ cc.

Then, from Equations 1 and 2

$$2x + 2.5y = 56.5 \qquad (1)$$

$$x + 2y = 33.0 \qquad (2)$$

From Equation 2, $x = 33.0 - 2y$

Substitute this value of x in Equation 1, and solve as follows:

$$2(33 - 2y) + 2.5y = 56.5$$
$$66 - 4y + 2.5y = 56.5$$
$$1.5y = 9.5$$
$$y = 9.5/1.5 = 6.33 \text{ cc. of } C_2H_6$$

Substituting this value of y in Equation 2,

$$x + (6.33) = 33.0$$
$$x = 33.0 - 12.66 = 20.34 \text{ cc. of } CH_4$$

Then, the 30 cc. of residue used in the combustion contained 6.33 cc. of C_2H_6 and 20.34 cc. of CH_4.

The volume of nitrogen in the 30 cc. of residue, then, is

$$30 - (6.33 + 20.34), \text{ or } 3.33 \text{ cc.}$$

Then the volume of each of these three gases in the 94 cc. of residue left after absorption, and consequently the volume of each component in a 100 cc. sample of the original gas, is found as follows:

Volume of CH_4 in cc. per 100 cc. of original gas = volume per cent of CH_4 in original gas = $20.34 \times 94/30 = 63.74$

Volume of C_2H_6 in cc. per 100 cc. of original gas = volume per cent of C_2H_6 in original gas = $6.33 \times 94/30 = 19.83$

Volume of N_2 in cc. per 100 cc. of original gas = volume per cent of N_2 in original gas = $3.33 \times 94/30 = 10.43$.

Then the complete analysis of the gas may be tabulated as follows:

Component—	Vol. per cent
Methane (CH_4)	63.74
Ethane (C_2H_6)	19.83
Nitrogen (N_2)	10.43
Oxygen (O_2)	2.00
Carbon dioxide (CO_2)	4.00
	100.00

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Simplified Flow Diagrams

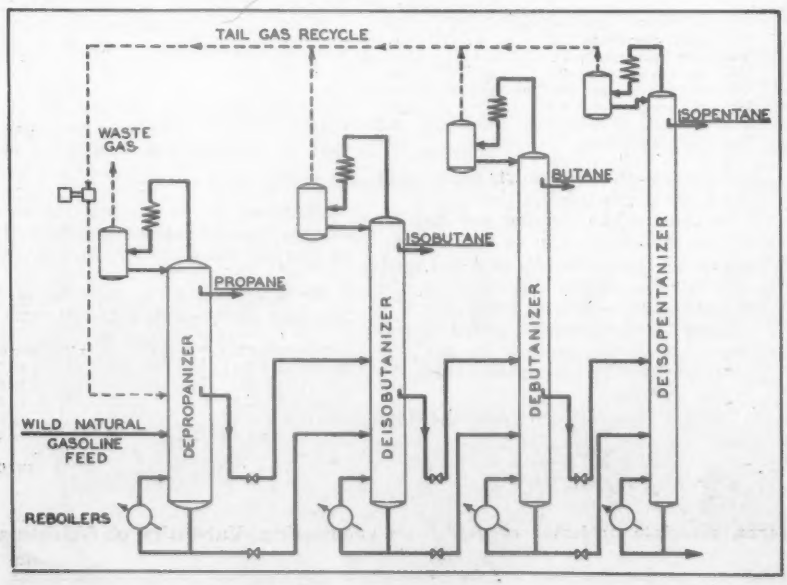
Fractionation for Pure Hydrocarbons

In connection with your December 3 Questions in Technology page and the discussion on the Manufacture and Stabilization of Isobutane, we would like to see a flow diagram of such an operation.—W. V. H.

A flow diagram would have been helpful in the discussion referred to above. In that discussion several references pertaining to the separation of hydrocarbons by fractionation were given; the article by Turner and Rubey in the Refiner of September 1938 or in Petroleum Refinery Engineering, second edition, page 367, McGraw-Hill Book Co., 330 West Forty-second Street, New York, 1941, being particularly pertinent.

In fractionating a mixture of hydrocarbons, a series of fractionators such as those shown on this page are required. In such an arrangement of equipment the hydrocarbons are removed one by one in the order of their boiling points. The pressure used in each of the fractionating towers should be as low as possible but not so low that the overhead product cannot be condensed at the temperature of the cooling water. Thus, a depropanizer would operate at 200 lb. per sq. in. or a little under, a deisobutanizer at under 100 lb. per sq. in., a debutanizer at under 60 lb. per sq. in., a deisopentanizer at under 25 lb. per sq. in., etc. If, however, the reboilers can be heated by some high-temperature (450°-600° F.) stock, such as a cracking-plant recycle oil, rather than by steam, the pressures can be increased somewhat. This will result in higher temperatures throughout, a much smaller amount of surface in the overhead condensers, and a somewhat larger amount of reboiler surface.

Each of the fractionators will require a relatively large reflux ratio (8 or more for normal percentages of overhead products) and the number of plates required for the separation is largest for the higher-boiling hydrocarbons because the boiling points of these materials are very close to one another. Perhaps 30 plates may be adequate for propane but 50 to 70 plates may be required for the separation of isopentane or heavier hydrocarbons. The number of hydrocarbons in the boiling range of 130°-200° F. is more than 16, and above a boiling point of 200° F. the number of possible hydrocarbons increases rapidly with temperature. Thus, an extremely complicated and expensive series of fractionating towers would be required to separate each of these many hydrocarbons.



From time to time technical men suggest the withdrawal of several hydrocarbons from the side of a single fractionating in much the manner used in a topping plant in a refinery. Such a scheme, even if followed by several afterfractionators for the main side-draw products, is exceedingly difficult to operate and probably would not justify the saving of perhaps one fractionator out of, say, the five that would be required for the conventional system. Even the system shown on this page is more complicated than most that have been installed and is perhaps the limit in the way of complications that should at the present time be contemplated.

Absorption of Methane in Oil

Will you kindly advise where we can obtain information on the pressures and temperatures required to absorb methane in mineral seal oil, or some better absorbent?—J. F. E.

The absorption of methane in various solvents is discussed by Sage, Hicks, and Lacey in a paper entitled "Tentative Equilibrium Constants for Light Hydrocarbons" which was presented before the June 1938 A.P.I. meeting at Wichita, Kans., or on page 231 of second edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., New York).

The absorption of methane is little affected by temperature in the range of 70° to 220° F., but it is vitally affected by pressure. The approximate cubic feet of methane absorbed at various pressures by 1 gal. of mineral seal oil (40 A.P.I. and M.W. 200) may be expressed as:

$$\text{Cu. ft.} = 0.00362 \times \text{pressure}$$

The relationship is reasonably accurate up to 250 lb. This indicates that 0.053 cu. ft. is absorbed at atmospheric pressures whereas 0.724 cu. ft. is absorbed at a pressure of 200 lb. per sq. in. (abs.).

Absorption agents of low molecular weight are best, and the above equation can be corrected for various absorbents as an inverse function of the molecular weight. Thus, gasoline is a better absorbent than mineral oil (being about twice as effective) but difficulty might be encountered with vaporization of the gasoline.

DUAL COMPLETIONS

As a means of increasing oil supply in Kansas with minimum use of materials needed for war

by Neil Williams

PROPOSALS are before the Petroleum Administration for War to provide that spacing restrictions in Kansas be relaxed to permit at least two dually completed wells on each 40 acres in those cases where there is already more than one well producing from any horizon and where the completion of the well involves only the conversion of an existing well. It is estimated that there are upwards of 700 wells in the state now producing from only one horizon that are capable of production from at least one additional horizon. Conversion of many of these wells, which would be possible under such provisions, would make available a substantial amount of additional production to meet the currently increasing demand of oil from the state and which it may have difficulty in supplying under the present limited new-well drilling program. At present the same spacing limitations govern dual completions that apply to new drilling within fields, that is, only one well can be completed for each 40 acres.

The additional production that might be available by such conversions is oil that would be obtainable fairly quickly for a comparatively small expenditure of money or effort and with the use of a negligible amount of critical materials. This would be especially true in those wells which do not have to be deepened to a lower horizon. In such cases the only major additional equipment involved is the specjal packer used in effecting the seal between the two producing zones. When a well must be deepened to a lower horizon extra casing and tubing also are involved, but usually the additional depth is not more than a few hundred feet. In new drilling in Kansas a dual completion can be made with only from 1,000 to 2,000 lb. more critical materials than required for a single zone completion.

Even prior to the curb on new drilling, the possibilities of dual completions as a means of conserving equipment and materials and reducing the costs of development in proving up areas having multiple producing zones were receiving increasing consideration on the part of Kansas operators. Compared with development of multiple producing zones by twin drilling important savings are effected. These are indicated in the fact that a dually completed well in this state normally will cost from $20,000 to $22,000, whereas if separate wells were to be drilled to the two respective horizons the total cost would run from $34,000 to $38,000. Now that approval cannot generally be obtained for twin drilling, dual completions may become the only means by which more than one producing horizon in any area may be developed.

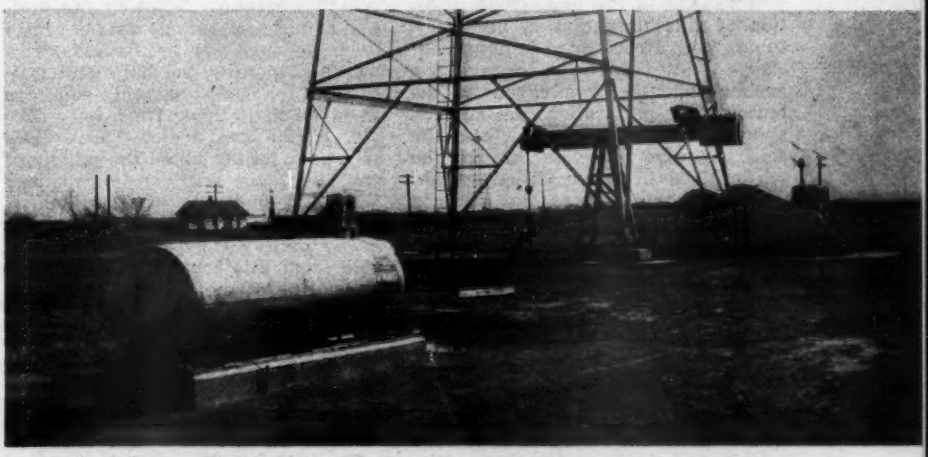
70 Dual Completions to Date

Approximately 70 dual completions have been made in Kansas to date. Most of these have been in fields of Rice and Barton counties, with a large number being by McPherson Drilling, Wichita. Twenty-four dual completions were made during 1942. This number probably would have been much greater had it not been for spacing restrictions. Dual completions were initiated in Kansas in July 1940. The first such completion was made by converting a well, located in the north end of the Chase field, Rice County, that had been producing from a single horizon for 3 years. Since then they have been about equally divided between conversions of old wells and drilling of entirely new wells.

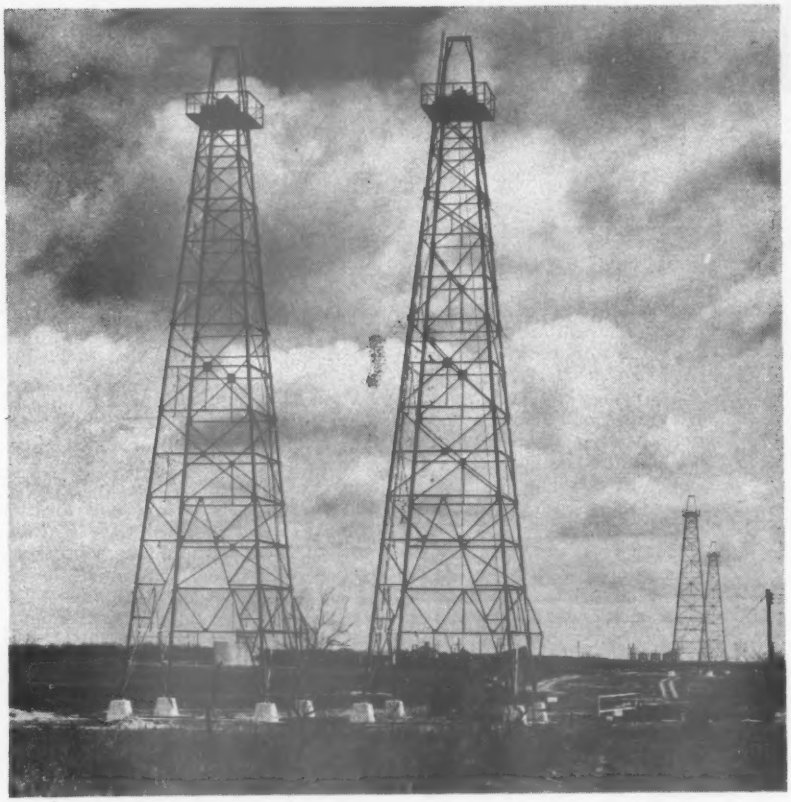
Kansas is an oil area of pumping production. When pumping is necessary the production of wells from more than one zone becomes more complicated and involves more problems than when production is by flowing. However, through practices which have been followed by operators in this state, most of the difficulties and problems apparently have been overcome, and satisfactory operation of dually completed wells has resulted.

Producing horizons concerned in the dual completions in Rice and Barton counties are the Kansas City-Lansing series as the upper zone and the Arbuckle lime as the lower zone. The former, which is found around 2,870 ft., contains from one to three pay zones with a thickness of from 5 to 15 ft. each. The Arbuckle lime, which is found at slightly under 3,200 ft., probably has a thickness of several hundred feet but generally is not penetrated more than 15 to 20 ft. Minimum penetration to get production is desired, sometimes not more than a foot or two because of the danger of water encroachment.

For dual completions involving these two formations the practice has been to drill the well first to the top of the Arbuckle dolomite, usually with rotary tools. Then, with the oil string landed at that point and cemented with enough cement to fill up behind the casing to above the top of the Kansas City-Lansing series, the well is completed in the Arbuckle in the usual manner, and the productivity in that formation established. Then a packing element is installed in the bottom joint of the oil string, this being run in and set with the string of tubing that is to be used in producing the well. The packer used so far has a flapper valve on the bottom which closes the opening in the



Butane-operated pumping well in Kansas field where dual completions have been employed



Twin wells showing the use of extra surface equipment not required by dually completed single wells in Kansas

packer when the tubing, which is run through the opening, is pulled. To test the effectiveness of the packer element in sealing off the Arbuckle, the hole above the packer is bailed dry. With the effectiveness of the seal assured, completion of the well in the Kansas City-Lansing producing zone is undertaken.

To complete in the Kansas City-Lansing the casing is perforated opposite the selected producing zone. It has been found that the best results are obtained at the minimum of three perforations to the foot. If acidification of this formation is necessary, tubing with a perforated joint and anchor on bottom is run in the well, the anchor joint being plugged at the bottom. The perforations are stopped above the packing element and the acid treatment is made through the perforations in a conventional manner. With the anchor joint plugged and the blank section extending through the packing element the danger of pumping acid into the Arbuckle formation is eliminated. If this procedure were not followed it is possible that the pressure built up to introduce the acid into the Kansas City-Lansing zone might be greater than the bottom-hole pressure of the Arbuckle, thus causing the flapper valve in the packer opening to open and permit acid to be pumped into the Arbuckle.

Without moving the location of the tubing, the necessary pump and rods can be run in and productivity tests made of the formation. The well now is completed in both formations with productivity established on each formation. Pumping both formations is accomplished by raising and lowering the tubing string to place the tubing perforations above or below the packing element, depending on which formation is to be produced.

Month's Allowable in 15 Days

In the practices followed the position of the perforations does not have to be changed more than once a month. Generally, the full month's allowable for each producing zone can be taken in 15 days. Thus, for example, if the perforations are raised above the packer about the middle of any month the well can be produced from the upper zone the last half of that month and the first half of the next month, getting 2 months' allowable from this zone before changing the setting of the perforations. Then, with the perforations lowered below the packer, the lower zone can be produced for a similar period, getting 2 months' allowable. By switching in the middle of the month the well is assured of getting the full allowable for each month from both zones.

These installations call for the use of pulling units in raising and lowering the tubing but the operation is simple and requires comparatively little time. In the older completions, operators are obliged to move the tubing about 8 ft. to place the perforations above or below the packer. However, this distance of travel is being substantially reduced in some of the newer wells as a result of improvements in technique and equipment. Also, some dual-completion installations now are being made in which perforations are opened or closed by rotating the tubing, instead of the tubing being raised or lowered. In these there are two sets of perforations, so that by closing the perforations below the packer the upper zone is produced and by closing the upper perforations and opening the lower perforations the lower zone is produced. Here, the weight of the tubing is suspended on specially designed tubing heads and moves on ball bearings. The basic principles in each type of installation are similar.

Success of the operation depends largely upon the use of an adequate amount of cement in cementing the casing to extend above the top of the upper producing horizon, and upon the effectiveness of the seal between the two formations. Should water conditions develop in either formation that cannot be corrected by cementing and make further production of oil from that zone impossible the formation can be squeezed and the remaining formation produced alone. All packing elements are made of drillable materials so that if a failure should occur packer can be removed and another installation made.

Equipment installations and procedure of operation of dual completions are strictly regulated by the Oil Conservation Division of the state Corporation Commission. Particular attention is paid to provisions for prevention of any communication between the two producing horizons of a well. Not only is the type of packer and its method of installation controlled so that an effective seal will be assured, but a close watch is kept on the characteristics of the fluid produced so that if any leak develops in the packer it can be observed quickly and repairs made. Chemical analyses of both oil and water produced from each zone are made when the packer is set or on completion in each zone, at 60-day intervals thereafter, and at any other time specially ordered by the commission. If these analyses reveal any leakage in the packer, repairs must be made immediately, or else one of the producing zones must be sealed by cementing. In addition each change in the position of the pump intake or tubing perforations from one side of the packer to the other must be witnessed by a representative of the Corporation Commission who places a seal on the tubing after the change which cannot be broken by the operator.

REFINING

Butadiene Conversion Projects Involve Outlay of $51,000,000

WASHINGTON, D. C. — Refineries converted to produce butadiene for synthetic rubber are using new material and equipment to the extent of only 27 per cent of the total cost of all the projects, the Gillette subcommittee of the Senate was told January 15 by Bruce K. Brown, assistant deputy petroleum administrator.

The 14 refinery-conversion projects now under contract are rated to produce 156,860 tons of butadiene per year, and their total cost is approximately $51,000,000, or an average investment of $320 per ton annual capacity, he said. Of the total cost, approximately $14,000,000 is for new equipment, or an investment of $90 per ton capacity, $19,000,000 is the estimated replacement value of used equipment, and $18,000,000 is for labor and other costs and noncritical materials such as sand and cement.

The original goal of the refinery-conversion program was to use not more than 20 per cent of new critical materials, but Mr. Brown explained that some large and expensive projects had been aproved rather late in the program and this raised the percentage of new material required.

Chairman Guy M. Gillette of Iowa placed in the record a table submitted by the Rubber Reserve Co. giving some additional data on each of the 14 projects which Mr. Brown had listed at a previous appearance before the committee. Mr. Brown explained that discrepancies in cost estimates between figures he had mentioned and those given by Rubber Reserve were not due to a difference of facts or opinion but because contract commitments are based on preliminary estimates of the costs to which the Government will be obligated.

Committee counsel Paul E. Hadlick questioned Mr. Brown about a number of the individual conversion projects, remarking that the high cost of some of them suggested that they might be more nearly new plants than conversions and might not meet the standards of new equipment use established when the program started nor the stipulation of the Baruch report that conversion projects be completed quickly. He suggested that the conversion program might be in reality a second petroleum butadiene program at the expense of critical materials which otherwise might be used to build plants to produce butadiene from alcohol.

Mr. Brown discussed the details of a number of projects to show the di-

(Continued on Page 78)

Imperial Oil to Build Calgary Alkylate Plant

CALGARY, Alta.—Announcement has been made by G. Harrison Smith, president of Imperial Oil, that plans have been drawn for a plant at Calgary to produce blending agents (alkylate) for use with aviation-base stocks produced in Canada. The plant, first of its kind in Canada, will operate on Turner Valley and refinery gases, and will be on production by the fall of 1943. Heretofore aviation fuel blending agents have been imported.

Texas Co. Makes Offer for Indian Refining Stock

NEW YORK.—An offer of one share of Texas Co. stock for each four of Indian Refining Co. has been made by the former company which already controls 91 per cent of the Indian's outstanding securities. A hearing on the offer is scheduled in the New York Supreme Court February 4.

If the transfer is accepted by minority stockholders, Texas Co. will acquire all assets of Indian Refining and may possibly dissolve the latter corporation, continuing operation of its refinery at Lawrenceville, Ill., under the name and direct supervision of the parent concern.

C. B. Bogart, vice president of Indian Refining Co., last week disclosed the receipt of Texas Co.'s offer and said that if it is accepted it would settle litigation brought against the majority stockholding company by minority interests.

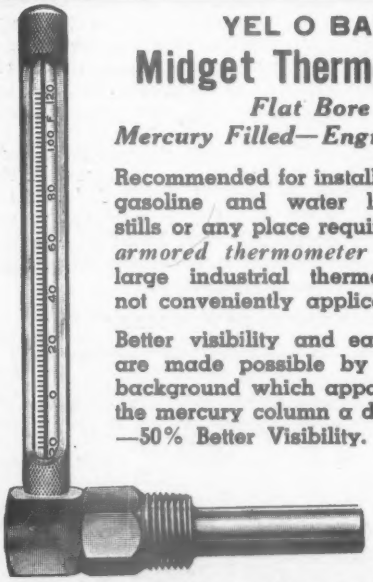
REFINERY CONVERSION PROGRAM FOR MANUFACTURE OF BUTADIENE FROM PETROLEUM

Company—	Location of plant	Feed stock	Butadiene tonnage	Authorization			Cost of project (preliminary estimate)
				Date of rubber director's directive	Date of letter of intent*	Amount authorized by letter of intent	
Arkansas Fuel Oil Co.	Bossier City, La.	B-B cut from Atlas and Lion	16,000 tons per year to be purified from B-B cut	11-20-42	Nov. 19,1942	$160,000	$315,359
Lion Oil Refining Co.	El Dorado, Ark.	Naphtha	B-B cut containing 6,700 tons per year of butadiene	11- 4-42	Nov. 4, 1942. Lease contract executed Dec. 15, 1942	450,000	1,037,273
Eastern States Pet. Co.	Houston, Tex.	Naphtha	13,000 tons per year of butadiene	11- 6-42	Oct. 29, 1942, amended Nov. 6, 1942. Lease contract executed Dec. 8, 1942	550,000	1,654,458
Southport Petroleum Co.	Texas City, Tex.	Naphtha and B-B cut from Pan American	8,000 tons per year from naphtha and 10,000 tons per year to be purified from B-B cut	10-29-42	Oct. 30, 1942. Lease contract executed Nov. 16, 1942	500,000	1,507,150
Pan American Ref. Corp.	Texas City, Tex.	Naphtha	B-B cut containing 10,000 tons per year of butadiene	11- 6-42	Sept. 23, 1942, amended Nov. 12, 1942	375,000	1,298,300

(Continued on Next Page)

Humble Oil & Ref. Co.	Ingleside, Tex.	Naphtha and B-B cut from Taylor refinery	7,000 tons per year from naphtha and 5,000 tons per year from B-B cut	11- 3-42	Nov. 3, 1942, amended Dec. 23, 1942	650,000	3,225,000
Taylor Refining Co.	Corpus Christi, Tex.	Naphtha	B-B cut containing 5,500 tons per year of butadiene	(Authorized by PAW. Approved by rubber director)	Dec. 4, 1942	110,000	737,953
Standard Oil Co. (Ind.)	Wood River, Ill.	Butane-butylene mixture and B-B cut Naphtha from Ohio Oil	40,400 tons per year from butane - butylene mixture and 3,600 tons per year to be purified from B-B cut	11- 6-42	Oct. 24, 1942, amended Nov. 6, 1942, and Dec. 14, 1942	6,232,000	13,557,800
Ohio Oil Co.	Robinson, Ill.	Naphtha	B-B cut containing 3,600 tons per year of butadiene	12-12-42	Dec. 18, 1942	110,000	432,204
Magnolia Petroleum Co.	Beaumont, Tex.	Butane	15,000 tons per year of butadiene	11- 9-42	Nov. 10, 1942, amended Jan. 1, 1943	800,000	3,000,000
Standard Oil Co. of Calif.	El Segundo, Calif.	Butane	15,000 tons per year of butadiene	10-24-42 Supplemented 12-12-42	Oct. 24, 1942, amended Dec. 18, 1942	2,600,000	6,200,000
Atlas Oil & Ref. Co.	Shreveport, La.	Naphtha	B-B cut containing 8,000-10,000 tons per year of butadiene	.....	June 10, 1942, amended Aug. 4, 1942. Purchase contract executed Oct. 27, 1942	300,000	870,000
Sun Oil Co.	Toledo, Ohio	Butane	15,000 tons per year of butadiene	8-11-42	Aug. 19, 1942. Lease contract executed Nov. 23, 1942	1,000,000	3,254,420
Standard Oil Co. of La.	Baton Rouge, La.	Naphtha	6 800 tons per year of buta-	9- 6-42	Sept. 25, 1942, amended Nov. 4, 1942	250,000	1,360,000

*Letters of intent were issued by either Defense Plant Corp. or Rubber Reserve Co., both wholly owned subsidiaries of Reconstruction Finance Corp. Lease contracts when executed authorize amounts not in excess of total estimated cost of project. In instances where the letter of intent preceded the day of the rubber director's formal directive, action was taken by Rubber Reserve Co. or Defense Plant Corp. pursuant to oral instructions from the rubber director.



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Midget Thermometer

Flat Bore

Mercury Filled—Engraved Stem

Recommended for installation on oil, gasoline and water lines; tanks, stills or any place requiring a *small armored thermometer* and where large industrial thermometers are not conveniently applicable.

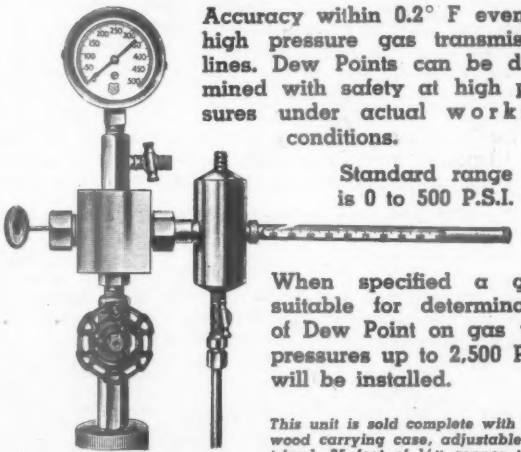
Better visibility and easier reading are made possible by the yellow background which apparently gives the mercury column a deeper shade —50% Better Visibility.

Four Styles

Special Sizes and Ranges made to your specifications and requirements. Write for YEL O BAK Bulletin.

—Accurate Determination—

Dew Point Tester



Accuracy within 0.2° F even on high pressure gas transmission lines. Dew Points can be determined with safety at high pressures under actual working conditions.

Standard range is 0 to 500 P.S.I.

When specified a gage suitable for determination of Dew Point on gas with pressures up to 2,500 P.S.I. will be installed.

This unit is sold complete with hardwood carrying case, adjustable field tripod, 25 feet of ⅛" copper tubing and necessary fittings.

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Houdry announces new catalytic process that will give America

A NEW SUPER AVIATION FUEL

vastly superior to any airplane gas ever produced by any known processes

Houdry scientists have developed a new catalytic refining process that can provide America with an aviation fuel incomparably better than any now being produced anywhere in the world.

It will tremendously improve the performance of American aircraft of current design.

Indeed, it is so vastly superior that today's aircraft engines cannot fully use its capabilities. For the time being, its value will be in raising the octane rating of present aviation gasolines.

Can Revolutionize Aircraft Engine Design

For military reasons, full details of the new process cannot now be revealed. But think what this amazing new Houdry development can mean to America's war effort, when aircraft engine design catches up to it! It opens up a whole new vista of possibilities for aeronautical engineers.

It can multiply the destructiveness of our air power. Make possible new planes—tremendously more powerful, incredibly faster—to give our flyers an enormous advantage in combat.

The new process has been completely developed on pilot-plant scale in Houdry laboratories. Engineering and construction of commercial units are now under way.

Another achievement of American science, accelerating the pace of our march to Victory!

Post-war Benefits

The importance of this and earlier Houdry developments will not end with the war. When peace comes, these Houdry processes will help to keep this country self-sufficient in synthetic rubber production; will produce high-quality, low-cost aviation fuel for an airminded America; will provide a greatly superior motor fuel for tomorrow's finer automobiles.

Houdry Plants Make 90% of America's Catalytically Cracked Aviation Gas

This new process is the latest of many Houdry accomplishments. Among other Houdry "firsts" are:—

First to develop and commercially pioneer catalytic cracking. The first Houdry catalytic cracker was built in 1936. There are 16 in operation today.

First to provide a catalytically cracked automobile gasoline of superior quality. Houdry catalytic crackers have produced more than a billion gallons of high grade motor gasoline annually.

First to produce catalytically cracked base for aviation gasoline. Houdry plants last year produced more than 90% of all catalytically cracked aviation fuel made in the world. *Better* gasoline than has been made by any other "cat crackers" in existence!

First cracked gasoline to meet U. S. Army specifications for aviation fuel was made by the Houdry process.

And now the capstone of Houdry achievements is the development of a process that can give America a new super aviation fuel *vastly better* than any airplane gas ever produced by any known process.

We are proud to offer Houdry Catalytic Processes to any and all American manufacturers without restriction, under license arrangements subject to approval by the United States Government.

HOUDRY PROCESS

THE HOUDRY PROCESS CORPORATION

WILMINGTON, DELAWARE

This advertisement has been submitted to the Office of Censorship which found no objection.

MILL WRAPPING

Our plants located at Glenwillard, Pa. (Pittsburgh suburb), Franklin Park, Ill. (Chicago suburb), Longview, Texas and Corpus Christi, Texas are devoted exclusively to mill coating and wrapping steel pipe.

Other Available Services . . .

Yard or railhead coating and wrapping. Traveling Type Coating and wrapping over the ditch.

PIPE LINE SERVICE CORPORATION

"Pioneers in Steel Pipe Protection"

Franklin Park, Illinois . . . Corpus Christi, Texas
Glenwillard, Pennsylvania . . . Longview, Texas

HIGH PRESSURE POWER PUMPS

2½—4x6 Stroke—Pressure: 1000 p.s.i. working, 2000 p. s.i. hydrostatic—Double suction and shaft extension—Timken Bearings.

Simplex—Duplex
Steam—Power Driven
Side Pot Close Clearance
Forged Steel
Cast Steel
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LEYMAN MFG. CORP.

McGowan Pump Division

59 CENTRAL AVE., - CINCINNATI, OHIO

JAMES ANDERSON COMPANY

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Established in 1893

available to the oil and gas industry for the surveying of extensive rights-of-way anywhere

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3 reasons why The Oil and Gas Journal is considered first in the pipe-line industry.

PIPE LINES

WEP Line Pump Stations May Start This Week

Completion of station facilities may make it possible to start operation of the Longview, Tex., and Little Rock, Ark., stations of the WEP 24-in. pipe line within a week.

Laying of the line has been completed with the exception of the Mississippi River crossing which had to be replaced with a new line on which work is now nearing completion. The line now holds about 270,000 bbl. of crude oil and 150,000 bbl. of water. It has been tested as far as the Saline River.

Cities Service May Build Panhandle-Kansas City Line

According to reports, Cities Service Gas Co. is considering plans for laying a 26-in. natural gas line from the Oklahoma Panhandle to Kansas City, Mo. The proposed line would handle 165,000,000 cu. ft. daily. The route proposed would traverse northern Oklahoma to a point in Osage County where it would turn north and then parallel the company's present trunk line.

Florida Line Shipments To Commence February 1

Trans-Florida Pipe Line Corp., building a line for DPC from Carabelle to Jacksonville, Fla., is filling the line with water and testing. The line consists of 202 miles of 8-in. and seven stations. The line was laid by Anderson Brothers. Stations were built by American Liberty Pipe Line Co. Daily shipments of 30,000 to 33,000 bbl. of gasoline and kerosene will be made through the line early in February.

Sinclair Operates Line From Corpus Christi

FORT WORTH, Tex.—Sinclair Refining Co. started moving crude oil through its new 8-in. line from Corpus Christi, Tex., east to Damon Mound where it connects with an existing 8-in. line to Houston.

Approximately 150 miles of new line was laid to complete the system which moves crude oil from the Corpus Christi - Duval - Government Wells-Clara Driscoll area to market. Sinclair purchased the facilities of the Continental Pipe Line Co. in the area in October 1942 and immediately began arrangements to establish the outlet through the facilities just put in operation. The new facilities will allow Sinclair to bring 20,000 to 22,000 bbl. of crude daily to Houston but this capacity will not be reached until sometime in February.

Sinclair interests entered the Ben Bolt, Tom Graham, and Alice fields with daily nominations for February of 722, 420, and 624 bbl., respectively.

The 150 miles of new line was built by the O. C. Whitaker Co.

Negotiations Continue for Second Corpus Christi Line

DALLAS, Tex.—Negotiations are still under way for construction of a second pipe-line system for moving oil from the Corpus Christi producing and refining district to Houston, Tex. Currently, negotiations are under way to purchase part of the United Gas Pipe Line Co.'s gas line in the area which would become a part of the new crude-oil and products system. If the gas line purchase is concluded, it will be 90 to 100 days before the system can be converted.

Approximately 50,000 bbl. of crude oil and 25,000 bbl. of heating oil daily are to be handled through the project. Construction of the new Corpus Christi-Houston system, a separate project from that placed in operation last week by Sinclair Refining Co., is to be handled by Humble Pipe Line Co., according to reports.

Humble Tries to Get More Oil for Project 1

DALLAS, Tex.—Possible shortage of crude oil to fill the capacity made available by Project 1 may result unless more light Gulf Coast crude is made available, according to a statement made by Rex T. Baker, Humble Oil & Refining Co., before the Texas Railroad Commission meeting here last week. Project 1 includes the facilities of the Stanolind Pipe Line Co. from Houston, Tex., to Oklahoma; Oklahoma Pipe Line and Ajax Pipe Line systems to Illinois; Ohio

Oil Co. to Pennsylvania and the Tuscarora line to the Atlantic Coast.

Humble Oil & Refining Co. is scheduled to provide most of the crude and asked that its nominations of Anahuac grade crude be increased to provide 10,000 bbl. of oil daily which would prevent idle capacity in the line of approximately that amount.

Governor Jones Opposes Tennessee Gas Pipe Line

Gov. Sam Jones of Louisiana appeared as a witness in Nashville, Tenn., this week in opposition to an application of the Tennessee Gas & Transmission Co., Inc., for construction of a natural gas line from South Louisiana fields to Tennessee and Alabama.

Louisiana claims the pipe line would seriously deplete limited natural gas reserves in order to furnish fuel to out-of-state areas near inexhaustible coal fields. Twelve intervenors, including the Department of Public Utilities of Arkansas, have joined Louisiana in opposition to the application.

Stanolind Lets Contracts For Loops to Two Firms

Contracts for 138 miles of loops in Texas and Oklahoma have been let to Jones & Brooks and I. C. Little on a fee plus basis.

Jones & Brooks is establishing a field office at Cleburne, Tex., in charge of O. T. Mapes, superintendent. The gang which has been laying more than 50 miles of 12-in. in North Texas and Oklahoma will complete its work at Jacksboro, Tex., this week and will be moved to the new contract south of Cresson, Tex.

On January 15 the Army and Navy awarded Jones & Brooks an "E" for meritorious service in the construction of lines for gas and water utilities at the naval station at Norman, Okla. The firm of Jones & Brooks has found it necessary to cancel arrangements for contracting a section of the work on the WEP crude oil line from Texas to the East Coast.

I. C. Little will establish field offices on February 1 in Osage County, Oklahoma, and in the Healdton, Okla., area.

The Stanolind contracts are as follows: Jones & Brooks, Cresson station to Itasca Junction and Lakenon station to Hubbard Junction, Texas, two loops totaling 53.69 miles of 8-in.; I. C. Little, Cresson station to Graford station, Texas, 21.44 miles of 8-in., Graford station to Bowie station, Texas, 25.54 miles of 8-in., Bowie station, Texas, to Healdton station, Oklahoma, 21.42 miles of 8-in. Two loops of 12-in. are also contracted by I. C. Little from Healdton to Pauls Valley station, 9.74 miles of new pipe; Hominy station to Blake station, 6.94 miles of second-hand pipe.

C. L. Rogers has contracted to take up 52 miles of 8-in. parallel to the 12-in. loops which Jones & Brooks has just completed laying.

Deep Rock Laying Line To Bonebrake Gas Pool

Deep Rock Oil Corp. is laying a 6-in. pipe line to the Mid-Continent Petroleum Corp. 1 Bonebrake, new gas pool opener in NW NW NE of 32-17n-5e, northwest of Agra in Lincoln County, Oklahoma. Gas will be handled to the Deep Rock system and some of it turned to Oklahoma Natural Gas Co.'s system.

The Bonebrake well was completed at mid-December for an estimated 31,000,000 cu. ft. of gas a day when pipe was perforated opposite the Skinner sand zone at 3,431-52 ft.

Pipe-Liners Nicknames

A. N. Horne, vice president and assistant general manager, War Emergency Pipelines, Inc., makes a hobby of collecting nicknames of men who work in the construction gangs of the pipe line industry. Each of these names applies to a definite individual to whom the nickname has stuck as he has moved about the country. Since the start of the WEP project, he has added a number of new names. Some of the most colorful are: "Under-the-Bed" Red, "Wildcat" Johnson, "Black Bottom," "Titanic Slim," "Weld Rope," "Beaumont Blackie," "Ukulele Veach," "Banjo Veach," "Tango Eyes Owen," "Gold Tooth 'Bam" (Alabama), "Mysterious Fat," "Fort Worth Whitey," "Sleepy Marquis." To this collection, names have been added by other men on the project: "Biscuit Slim," "Sucker Rod Slim," "Three-Day Whitey," "Timber Ned," "Step and a Half Riley," "Artillery Red" and "Cream Puff Shorty."

I. Paul Savage and Jack Hearrell, supervising engineers, Defense Plant Corp., inspecting construction work at Longview, Tex., terminal of War Emergency Pipelines, Inc.

WHEATLEY

PUMPS

DUPLEX

2½" to 4" x 6" V-Belt or Direct
46 BPH at 1120 lbs.
125 BPH at 417 lbs.

3" to 6" x 6" V-Belt or Direct
68 BPH at 767 lbs.
288 BPH at 181 lbs.

2½" to 5" x 10" Direct Drive
59 BPH at 1325 lbs.
278 BPH at 330 lbs.

2½" to 7" x 10" Direct Drive
92 BPH at 920 lbs.
557 BPH at 168 lbs.

2½" to 5" x 10" V-Belt
59 BPH at 1400 lbs.
278 BPH at 405 lbs.

3" to 7" x 10" V-Belt
92 BPH at 1203 lbs.
557 BPH at 202 lbs.

2½" to 7" x 10" V-Belt
92 BPH at 1400 lbs.
557 BPH at 303 lbs.

3" to 8" x 10" V-Belt
92 BPH at 1400 lbs.
733 BPH at 230 lbs.

TRIPLEX

3" to 5¾" x 8" V-Belt Drive
156 BPH at 1605 lbs.
631 BPH at 396 lbs.

QUINTUPLEX

2½" to 4" x 6" V-Belt
199 BPH at 1500 lbs.
555 BPH at 600 lbs.

3" to 5¾" x 8" V-Belt
260 BPH at 1605 lbs.
1050 BPH at 396 lbs.

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Full Pipe Opening Horizontal Swing
Standard Bronzed Trim
2" to 24"—Series 15-30-40-60
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2" to 24"—Series 15-30-40-60
FBE-SBE—FOE & SOE

GATE VALVES

2" to 12"—Series 30-40-60
Rack Type — Self Cleaning Disc. Has Teeth and Rides a Rack Cast in Valve Body. Cleans each operation — never freezes — easier to operate.

TWIN VALVES

2" to 12"—Series 30-40-60
Flanged Both Ends
Rack Type: Gate and Check Together

LIQUID SEAL EQUALIZER

Heavy Liquid is Used As a Piston Between Air in Chamber and Liquid Being Pumped — Air Can't Contact Liquid Being Pumped—Nothing Wears Nothing To Be Replaced — Any Size

STRAINERS

GASOLINE or CRUDE OIL
Single or Twin
Line Type or Streamlined

ALL PIPELINE SUPPLIES

WHEATLEY PUMPS and VALVES
TULSA OKLAHOMA

Natural Gas

Cabot Plea to Abandon New York Line Rejected

WASHINGTON, D. C.—The Federal Power Commission last week refused to sanction abandonment of pipe-line facilities in upper New York State as petitioned by Cabot Gas Corp. and Godfrey L. Cabot, Inc. Cabot Gas Corp. sought permission to abandon the service of natural gas from its 14-in. line and to discontinue delivery of gas for resale by Godfrey L. Cabot, Inc.

"Should these applications be granted," the F.P.C. declared in its opinion, "certain industries of which several are engaged in war production, numerous towns and villages, including at least several hundred homes and a number of schools and buildings now heated by gas, might and probably would be, on short notice, deprived of essential services which the applicants have undertaken to render and for which the public has properly relied upon.

"In spite of the fact," the commission opinion went on, "that the Cabot interests have dissipated and exploited their supplies of natural gas in the New York-Pennsylvania area to the ultimate loss, disadvantage and inconvenience of the large number of its domestic consumers, the basic and ultimate question with which we are here confronted is the sufficiency of the applicants' presently available supply of natural gas."

It is, the opinion points out, an established fact that this supply of natural gas within the New York-Pennsylvania producing area is rapidly reaching a point of complete exhaustion. It is clear that natural gas cannot be made available to Cabot from any other source in the area adjacent to the pipe line.

Except for relatively small estimated deficiencies through next March, says the opinion, Cabot's own estimates indicate that their supply of natural gas will be reasonably adequate through June 1943. It is therefore concluded that Godfrey L. Cabot's supply of natural gas is not depleted to the extent that discontinuance of service is warranted. "Too much emphasis," the commission states in its opinion, "cannot be placed upon the fact that the complete exhaustion of this supply of natural gas is rapidly approaching and that unless prompt and immediate steps are taken by all concerned there will come a time in the not far distant future when natural gas will no longer be available from this source."

Thacher Made Technical Consultant in Gas Section

WASHINGTON, D. C.—John H. Thacher, Jr., an analyst in the natural-gas division of the Standard Oil Co. of California, has been appointed technical consultant in the Natural Gas and Natural Gasoline Division, Petroleum Administration for War. Before joining PAW, he was attached to the executive office of the chairman of the War Production Board, where he served as organizational consultant since June 1942.

From September 1925 to June 1926, Mr. Thacher was instrument man on a geological-survey party of Roxana Petroleum Corp., at Okmulgee, Okla. From November 1930 to June 1941, he was analyst for the gas division of Standard of California with headquarters in San Francisco, Calif.

In June 1941, he received the Alfred P. Sloan Fellowship in business and engineering administration which led to his M.S. degree from Massachusetts Institute of Technology in May 1942. The following month he joined the WPB staff.

As technical consultant to the director of the Natural Gas and Natural Gasoline Division, Mr. Thacher will be chiefly responsible for technical work incident to providing and maintaining supplies of natural gas for industrial and other essential purposes.

Independent Gas Co. Rate Hearing Is Postponed

WASHINGTON, D. C.—The Federal Power Commission last week postponed until 9:45 a.m., January 26, the hearing on a rate schedule submitted by the Independent Natural Gas Co. in Bartlesville, Okla. The hearing will be held in the Hurley-Wright Building, Washington.

The proposed schedule would increase rates for natural gas sold to Arkansas Louisiana Gas Co. of Shreveport, La. The Arkansas Louisiana company operates in a number of Arkansas, Louisiana and Texas communities.

The order of November 24 states that "in purported justification of the proposed increased rates or charges, Independent Natural Gas Co. stated that it must make a substantial additional investment and will incur additional expense in order to supply the increased volumes of natural gas provided for in the supplemental-rate schedule, and it was further stated that the Independent company must pay increased amounts to Phillips Petroleum Co. for the purchase of the natural gas which it sells to Arkansas Louisiana Gas Co.

Cunningham Gas Field Irregularities Alleged

WICHITA, Kans.—Allegations that natural gas has been withdrawn from other sources and assigned to allowables of wells in the Cunningham field of Kingman and Pratt counties, Kansas, will be investigated here January 26 at a hearing before the Corporation Commission.

The commission has received information that its production orders for wells in the Cunningham field are in error, that certain wells have been unable to produce their current allowables, that the demand for gas from wells in the field is being satisfied by production from other pools and that owing to conditions and practices overproduced wells have been unable to equalize their takes with other wells.

Testimony on the allegations will be taken by the commission after which it will decide whether to initiate a general investigation. New production orders will be based on the evidence adduced.

United Fuel Gas Co. Rates Will Be Investigated

WASHINGTON, D. C.—An investigation into the reasonableness of the rates being charged by the United Fuel Gas Co. will be instituted by the Federal Power Commission.

The investigation arises out of complaints filed by the Pennsylvania Public Utility Commission and the city of Columbus, Ohio.

The Pennsylvania commission has alleged that the rates charged by United for transporting gas enter into and make excessive and unlawful the rates charged by Pittsburgh & West Virginia Gas Co. to Equitable Gas Co. while the city of Columbus alleges that the rates charged by United Fuel Gas Co. for gas sold to Ohio Fuel Gas Co. are excessive, unjust, discriminatory and unlawful.

The United Fuel Gas Co. is a subsidiary of the Columbia Gas & Electric Corp., holding company system and engages in the production, purchase, and transportation of natural gas in West Virginia, Kentucky and Ohio.

Exploration and Drilling

Week's Highlights

WITH wildcatting occupying the spotlight in drilling plans for 1943, certain areas are suggested in which fields of at least moderate size might be found without too great a risk. One of these is in the northwesterly extension of producing trends in West Texas and last week a discovery was recorded southwest of Wasson which is in line with expectations resulting from 1942 drilling. Another area which is in the week's news is the broad zone between the Nemaha Ridge fields and the production in eastern Oklahoma. This sector has been tested at many places. Tonkawa, Lucien and Guthrie prove that good accumulations of oil may be found. Last week's discovery may revive interest in it. Southern Oklahoma is also about ready to break into the news again with a followup of the good discoveries of recent years in that area.

OKLAHOMA: Approximately midway between the western edge of the Seminole area and the Oklahoma City field, a Wilcox strike 10 miles west of Shawnee opens up a large area for production. Some small producing spots have been found in this area but the present discovery marks the best chance for developing important production in the area (p. 78).

WEST TEXAS: A wildcat 6 miles southwest of Wasson in Gaines County opened a new pool in the Tubb horizon in the Clear Fork. This horizon also forms a pay at Wasson, although there is only one producer in it. The discovery is on the same trend as the Fullerton and Embar fields in Andrews County (p. 66).

LOUISIANA GULF COAST: Production was found below 9,000 ft. on the northeast flank of the Napoleonville dome, St. Landry Parish (p. 70).

KENTUCKY: Showings are reported from the Benoist and Aux Vases in two Carter wildcats in Henderson County (p. 72).

MICHIGAN: The second well in the Aetna area, Missaukee County, made a better initial flow than the discovery ½ mile to the east and may start considerable drilling (p. 69).

ILLINOIS: A well in the Friendsville pool in northern Wabash County, has reported showings in the Levias (p. 73).

NORTH TEXAS: A new Caddo lime pool has been opened in Clay County and a test in the Joy pool added a Strawn pay to the other producing horizons in that pool, the Caddo and Mississippi lime (p. 68).

SOUTHWEST TEXAS: The Tynan pool discovery in Bee County made a small flowing well with about 50 per cent water. In Jim Wells County, Shell has opened the Von Blucher pool with gas-distillate production. The test is east of La Gloria. North Sun, Starr County, is extended to the west (p. 72).

TEXAS GULF COAST: Gas and distillate are reported in the Wilcox in a Colorado County test east of Ramsey (p. 70).

KANSAS: Kansas City-Lansing production has been found by a Phillips County test 2 miles northeast of Ray. The Topeka lime yielded oil in a test east of the north end of the Fairport field, Russell County, and a wildcat midway between Iuka and the new Carm pool in Pratt County got Arbuckle production (p. 75).

COMPLETIONS IN ALL FIELDS . . .

(Week Ended January 16, 1943)

	Oil	Gas	Dry	Total	Footage	Comp. to date 1943†	Comp. to date 1942*
N. Y., Pa., and W. Va.	43	11	4	58	104,214	107	324
Ohio	1	4	6	11	40,710	19	82
Indiana	1	2	1	4	6,231	6	48
Kentucky	0	3	0	3	7,766	4	39
Illinois	17	0	11	28	87,621	73	186
Michigan	6	0	3	9	25,481	20	54
Kansas	13	0	18	31	102,744	55	120
Nebraska	0	0	0	0	0	2	0
Missouri, Iowa	0	0	0	0	0	0	0
Oklahoma	8	0	17	25	87,933	46	83
Texas:							
North Central Texas	12	2	9	23	60,882	46	119
West Texas	13	1	2	16	73,224	29	128
Texas Panhandle	4	1	1	6	19,349	10	51
Eastern Texas	2	0	0	2	13,158	5	34
Texas Gulf Coast	8	0	5	13	92,794	19	71
Southwest Texas	12	1	14	27	125,963	44	96
Total Texas	51	5	31	87	385,170	153	499
North Louisiana	5	1	2	8	30,351	10	56
Louisiana Gulf Coast	7	3	3	13	102,673	21	63
Total Louisiana	12	4	5	21	133,024	31	119
Arkansas	2	0	2	4	25,207	6	11
Mississippi and Southeast	0	0	0	0	0	0	14
Montana	4	0	1	5	9,738	8	7
Wyoming	0	1	2	3	9,192	6	4
Colorado, Utah	0	0	0	0	0	1	0
New Mexico	6	0	1	7	21,644	9	18
California	19	0	5	24	97,651	28	68
Total United States	183	30	107	320	1,144,346	574	1,668
Total previous week	142	16	96	254			
Week ended Jan. 17, 1942	377	51	125	553			

*Three weeks. †Two weeks.

PERMIAN BASIN, PANHANDLE

Gaines County Wildcat Opens Pool From Tubb Horizon

MIDLAND, Tex.—Shell Oil Co., Inc., 1 D. N. Leaverton, SW SW Section 458, Block G, C.C.S.D.&R.G.N.G. Ry. Co. Survey, northwestern Gaines County, flowed 113 bbl. in 24 hours through open 2-in. tubing, showing 2½ per cent water to open a new pool. The well had been washed with 500 gal. acid in about 300 ft. of broken pay section from 7,480 ft. to a total depth of 7,772 ft. The pay is the Tubb horizon of the Clear Fork lime and opens a large area for exploration.

The well is located 6 miles southwest of the Wasson pool, which produces from the San Andres lime at around 5,000 ft., but has one well producing from the Clear Fork. It is Amon G. Carter 4 Wasson, NW SE Section 50, Block AX, Public School Lands, which had the pay from 7,055 to 7,433 ft. and flowed 511 bbl. per day when completed in November 1941. The Carter test was originally drilled to 1,108 ft., total depth, but was plugged back.

The new strike is in a direct line north 15° west and 30 miles from the Fullerton pool in Andrews County which also produces from the Clear Fork at about 7,200 ft., and on the same course is 50 miles from the Embar Permian pool in southern Andrews County which was opened last year. The Embar pool produces from the same zone and from the San Andres and Ellenburger limes. Acreage in the area, which has been designated as the Russell area, is tightly held, with Magnolia Petroleum Co. and Atlantic Refining Co. owing the greater portion in fee. Besides Shell, Phillips Petroleum Co., Sinclair Prairie Oil Co., Cities Service Oil Co. and the Texas Co. are the major lease owners. The new pool is located on a structure which has been known to exist for some time and many San Andres lime tests have been drilled in the area, all failures.

Deep Tests

In Crane County Gulf 1 W. A. Estes, Section 2, Block B-28, Public School Land, was drilling below 6,648 ft. 4 miles southwest of the Apco-Warner pool in Pecos County. Anderson-Prichard 1-A M. I. Masterson was drilling below 3,150 ft. in lime. Contract depth is 6,000 ft. In the same county Magnolia 1-29 Eaton, 8 miles southwest of the Abell pool, was drilling below 5,310 ft. after recovering drill pipe. Phillips 1 Price, 27 miles southeast of Fort Stockton, was finishing at 8,707 ft.

In Winkler County Amon Carter C-2 Walton was reported to have passed a good saturated section, but information on this well is withheld. Depth is around 7,400 ft. In the same county Magnolia 20 State - Walton, a deepening job from old total depth of 8,445 ft., was drilling below 8,461 ft. Shell 1 Blue, eastern Winkler wildcat, was drilling at 8,505 ft. in chert. Original contract depth was 8,500 ft.

In northeastern Yoakum County Barnsdall Oil 1 Heath, NE NE Section 315, Block D. J. H. Gibson Survey, a 7,500-ft. test was drilling below 5,200 ft. in hard lime.

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 16 crude oil	Jan. PAW quota all oils	Jan. 9 crude oil
Arkansas	75,150	78,300	75,200
California	783,500	815,000	771,250
Colorado	6,290	7,000	6,400
Eastern fields	93,100	107,600	93,000
Illinois	235,000	272,600	255,000
Indiana	17,000	17,200	15,750
Kansas	300,650	310,000	265,400
Louisiana	339,850	347,500	339,800
North Louisiana	*92,800*	.....	*92,700*
Louisiana Gulf Coast	*247,050*	.....	*247,100*
Michigan	62,400	63,700	56,700
Mississippi	58,550	50,000	64,300
Montana	20,660	24,700	21,790
Nebraska	3,000	3,400	3,000
New Mexico	104,550	105,300	99,000
Oklahoma	347,400	400,600	349,800
Texas	1,339,700	1,426,800	1,328,800
East Texas	*327,000*	.....	*327,600*
West Texas	*200,000*	.....	*200,300*
North Central Texas	*136,400*	.....	*136,200*
East Central Texas	*101,000*	.....	*101,600*
Texas Panhandle	*88,600*	.....	*88,300*
Texas Gulf Coast	*420,600*	.....	*408,600*
Southwest Texas	*66,100*	.....	*66,200*
Wyoming	93,200	94,500	87,640
Total United States	3,880,000	4,124,200	3,832,830
Total production Jan. 1-Jan. 16, 1943			61,729,520 bbl.
Same period last year			66,121,760 bbl.

WEST TEXAS COMPLETIONS

Wildcats

Sutton County: S. B. Roberts 2 George Allison, NW SW Sec. 25, Blk. K, G.H.&S.A. Sur., elev. 2,375 ft., flowed 16,300,000 cu. ft. sweet gas, pay 3,754 ft., T.D. 3,761 ft., gas discovery.

Fields

Barnhart, Reagan County: Sharples Co. 1 University, NW SW Sec. 3, Blk. 48, University Sur., elev. 2,771 ft., flowed 1,520 bbl., pay 9,060 ft., lime, acid 1,000 gal., T.D. 9,122 ft.

Embar-Ellenburger, Andrews County: Phillips Pet. 30 University-Andrews, SW SW Sec. 29, Blk. 10, University Sur., elev. 3,254 ft., flowed 375 bbl., pay 7,930-48 ft., Ellenburger, P. B. 7,949 ft., T.D. 7,957 ft.

McKee, Crane County: Magnolia Pet. 1 Nellie Tucker, Sec. 20, Blk. 1, H.&T.C. R.R. Sur., elev. 2,452 ft., detrital 5,325 ft., McKee sand 6,210 ft., Ellenburger 6,950 ft., perf. 3,360-70 ft. in Permian, dry, T.D. 7,204 ft.

North Cowden, Ector County: Stanolind Oil & Gas 5-D Midland Farms, Sec. 45, G.&M.M.B.&A. Sur., elev. 3,070 ft., pumped 219 bbl., pay 4,670 ft., lime, P.B. 4,851 ft., T.D. 4,968 ft.

Pecos Valley High Gravity, Ward County: Jamison & Pollard 4-B Texas Cotton Industries, Sec. 35, Blk. 1, H.&T.C. Sur., flowed 96 bbl., pay 1,893 ft., shot 45 qt., T.D. 1,917 ft.

Slaughter, Cochran County: Devonian Oil 15-A Dugga, NE Lab. 8, Lge. 55, Oldham County School Land Sur., flowed 784 bbl., 31.5 gravity, pay 4,980 ft., acid, T.D. 5,027 ft.

J. C. Hawkins 7-A Mallet, NW Lab. 24, Lge. 47, Edwards County School Land Sur., flowed 842 bbl., 32 gravity, pay 4,913 ft., T.D. 4,968 ft.

Slaughter, Hockley County: J. C. Hawkins 9-A Mallet, SE Lab. 24, Lge. 47, Edwards County School Land Sur., flowed 914 bbl., pay 4,924 ft, acid, T.D. 4,984 ft.

Texas Co. 135 Slaughter, SE Lab. 80, Lge. 37, Zavalla County School Land, elev. 3,533 ft., flowed 1,680 bbl., 31.5 gravity, pay 4,930 ft., acid, T.D. 5,000 ft.

T. F. Morrow 4 Mallet, NW Lab. 23, Lge. 48, Edwards County School Land Sur., elev. 3,600 ft., flowed 489 bbl., pay 4,922 ft., acid, T.D. 4,968 ft.

Spencer, Ward County: Texas Co. 1 Mollie Spencer, E¼ S¼ Sec. 53, Blk. 34, H.& T.C.R.R. Sur., elev. 2,625 ft., flowed 144 bbl., 29 gravity, pay 2,918 ft., lime, T.D. 2,928 ft.

Taylor Link, Pecos County: William Wolfe 2-B University, NE NE NW Sec. 32, Blk. 16, University Sur., elev. 2,493 ft., pumped 6 bbl., 31 gravity, pay 1,389 ft., sand and lime, T.D. 1,450 ft.

Walker, Pecos County: J. D. Lancaster 1-G University, SW SE Sec. 12, Blk. 16, University Sur., elev. 2,908 ft., dry, T.D. 2,220 ft.

William Wolfe 7-A University, NE SW NE Sec. 26, Blk. 16, University Sur., elev. 2,642 ft., pumped 7 bbl., pay 1,687 ft., P.B. 1,691 ft., shot 10 qt., T.D. 1,723 ft.

Wasson, Gaines County: Bay Pet. et al 1 J. A. Blair, NW SW Sec. 39, Blk. AX, Public School Lands, elev. 3,531 ft., flowed 496 bbl., 34.9 gravity, pay 4,960 ft., acid 2,000 gal., T.D. 5,027 ft.

SOUTHEAST NEW MEXICO COMPLETIONS

Wildcats

Lea County: Tide Water Oil 1 Alves & Howell, SW NE 31-18-35e, elev. 3,939 ft., solid lime 4,489 ft., dry, T.D. 5,315 ft.

Fields

Jackson, Eddy County: Nash-Windfohr & Brown 5-B Jackson, NE NW 1-17-30e, elev. 3,727 ft., flowed 25 bbl., pay 2,935 ft., P.B. 3,090 ft., T.D. 3,167 ft., lime.

Penrose, Lea County: Parker Drlg. 1-X A. B. Baker, NE SE 10-22-37e, elev.

(Continued on Page 77)

RUGGED POWER

GARDNER DENVER

"F X" Power Slush Pump

1. Rugged Strength—one-piece semi-steel cast frame, with integral crosshead and main jackshaft supports insures perfect alignment and the *extra* strength needed to meet the tough assignments.

2. Divided Fluid End—streamlined with long radius—large area fluid passages into the valve pots, assuring less fluid friction, quicker filling and making higher lifts possible.

3. Positive Flood Lubrication—assures adequate lubrication of all working parts. *Oil-stop* and *Mud-stop* heads keep mud and water from power end.

4. Abrasion Resistant—*"Slush Proof"* hardened rods, liners and pistons—*"Slush Proof"* Duo-seat valves—fluid cylinders cast of wear-resistant GarDurloy, the stronger, tougher cast iron makes Gardner-Denver Slush Pumps long-lived with the minimum of maintenance.

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NORTH CENTRAL TEXAS

Caddo Lime Pool Assured in Northeastern Clay County

WICHITA FALLS, Tex. — Roy Lee, trustee, 1 Maddox, T. M. Hughes Survey, in northeastern Clay County, assured a new Caddo lime pool when it pumped 189 bbl. oil in 24 hours after an acid treatment of 5,000 gal. from 5,475-5,505 ft. through perforations in casing. The test is bottomed at 5,672 ft. It is an offset to a dry hole drilled last year by Shell Oil Co., Inc., to a depth of 5,700 ft., which had oil stains from 5,618-40 ft., but which was plugged because of lost tools.

In the Joy pool, Shell opened a new producing horizon with 3 Mattie Clark which was plugged back from a total depth of 6,135 ft., perforated casing opposite the Strawn sand at 3,950-75 ft. and pumped 71 bbl. oil and 7 bbl. of water in 24 hours. The Joy pool is now producing from Strawn sand, Caddo lime, and Mississippi lime.

In Cook County, Sinclair Prairie has extended the Walnut Bend pool one location east at 1 Winger, 330 ft. from the north and west lines of Lot 70, Fannin County School Land Survey. The well missed the Ramsey and Best pays in drilling to 5,550 ft., but perforated below them opposite the Simpson sand and flowed 64 bbl. oil in 1 hour through 203 shot holes from 5,495 to 5,535 ft.

In Jack County, Worsham 1 Hensley A was shut down after finding the last joint of pipe collapsed after a 90-qt. shot from 5,270-5,314 ft. Same operators 1 Meador estate was drilling below 5,269 ft. Both of these operations are twin wells to lost holes that indicated oil possibilities.

NORTH CENTRAL TEXAS COMPLETIONS

Wildcats

Archer County: Fish Bros. 1 D. W. Fish, Sec. 84, Harris subd., dry, T.D. 1,413 ft.

Jack County: Hanlon-Buchanan 1 W. D. Stinehouse, S.A.&M.G.R.R. Sur. A-589, S.O. 2,374-79 ft., dry, T.D. 2,379 ft.

Charles H. Kadane 1 Lester Carter, Sec. 3311, T.E.&L. Sur., dry, T.D. 345 ft.

Young County: George W. Cooper 1 Graham, Sec. 2723, T.E.&L. Sur., dry, T.D. 4,926 ft.

Fields

Antelope, Clay County: Shell 1 M. L. Henderson, NW cor. Sec. 2624, T.E.&L. Sur., pumped 55 bbl., pay 3,190 ft., Strawn sand, T.D. 3,197 ft.

Bowers, Montague County: Burk Roy. 2 P. J. Martin, C. A. Barnes Sur. A-48, flowed 350 bbl., pay 3,500 ft., T.D. 3,515 ft.

Farmer Pool, Young County: B. C. Gilmore 1 D. Holley, J. W. Paddock Sur. A-1625, pumped 4 bbl., pay 522 ft., T.D. 530 ft.

Hull-Silk Caddo, Archer County: Continental Oil 2 L. W. McCrory, Tr., Sec. 28, A.T.N.C.L. Sur., flowed 303 bbl., pay 4,312 ft., lime, shot 60 qt., T.D. 4,352 ft.

Joy, Clay County: Shell Oil 1 A. Goad, Lot 20, H. Williams Sur., temporarily abandoned, T.D. 75 ft.

Shell Oil 3 Mattie Clark, Lot 21, H. Williams Sur., flowed 71 bbl., pay 3,950-75 ft., P.B. 3,980 ft., T.D. 6,135 ft.

Markley, Young County: C. B. King 5 W. F. Brown, S. Tynes Sur. A-274, pumped 10 bbl., pay 534 ft., T.D. 547 ft.

Megargel, Archer County: Producers Dev. 19 G. H. Roach, Sec. 1598, T.E.&L. Sur., dry, T.D. 1,280 ft.

Scotland, Archer County: Roy Lee, trustee, 1 A. B. Edwards, Lot 24, George Bruner Sur. A-8, flowed 96 bbl., perf. 5,195-5,210 ft., acid, T.D. 5,719 ft.

Shell Oil 6 W. M. Coleman, H. S. Smith Sur. A-396, flowed 530 bbl., pay 5,043 ft., lime, T.D. 5,083 ft.

Thornberry, Clay County: Johnson et al 3 T. A. Cheeves, Sec. 55, Bacon subd., dry, T.D. 1,194 ft.

Watson, Clay County: J. A. Chapman 2 E. C. Newton, B. R. Cobb Sur. A-978, flowed 270 bbl., acid 3,000 gal., pay 5,497 ft., line, T.D. 5,511 ft.

Whitaker Oil 1 J. L. Gragg, Sec. 2672, T.E.&L. Sur., flowed 117 bbl., pay 3,655 ft., sand, T.D. 3,675 ft.

Whitaker Oil 2 Mrs. L. M. Newton, Sec. 2673, T.E.&L. Sur., flowed 131 bbl., pay 5,452 ft., lime, acid 3,500 gal., T.D. 5,475 ft.

Whitaker Oil 3 Mrs. L. M. Newton, Sec. 2673, T.E.&L. Sur., flowed 199 bbl., pay 3,619 ft., sand, T.D. 3,657 ft., shale.

WEST CENTRAL TEXAS

FORT WORTH, Tex.—New location has been announced for a Mississippi lime test to be drilled in northern Stephens County by J. D. Hancock of Dallas at his 1 Blach Brothers, SW SW Section 1144, T.E.&L. Survey, 8 miles southwest of Eliasville. The wildcat will test the horizons opened last year by Christie Brothers in the Donell pool, old Caddo producing area just west of Eliasville.

In the Eliasville pool, Texas Pacific Coal & Oil Co. 12 S. H. Hill, Section 1122, T.E.&L. Survey, first test to be drilled in the area in several years, has cemented 5½-in. casing at 4,226 ft. and will test the Caddo lime section topped at 4,220 ft. On drill-stem test operators recovered 60 ft. of oil and 90 ft. of oil-cut mud. Total depth is 4,236 ft. in lime.

In Hood County Dr. T. J. Jefferies located 1 R. Haworth 1,200 ft. from the northwest line and 900 ft. from the southwest line of Wherry Adams Survey, 8 miles south of Granbury for a 5,000-ft. test.

WEST CENTRAL TEXAS COMPLETIONS

Wildcats

Shackelford County: I. R. McKay 1 Tucker, Sec. 553, T.E.&L. Sur., dry, T.D. 952 ft.

Fields

Allen & Ritchie, Palo Pinto County: Hickok

(Continued on Page 77)

EASTERN TEXAS FIELDS

Oil Stains Found in Woodbine Sand in Dallas County Test

DALLAS, Tex. — Paluxy sand has been topped at 2,392 ft. in the wildcat being drilled in southeast Dallas County by Capt. J. F. Lucey and S. A. Guiberson, Jr., at D. H. Myers, in the Thomas Johnson Survey, 4 miles northeast of Ferris. Woodbine was topped at 1,285 ft. and Georgetown lime at 1,761 ft. The Woodbine sand from 1,590-1,610 ft. showed very small oil stains. Drilling had progressed to 2,697 ft. in lime.

In Shelby County the test of Humble 1 J. T. Harris was drilling below 5,045 ft. after having overcome to some extent the trouble with cavings. The test is projected to the Pettit lime.

In Wood County, Quitman pool, Shell Oil 1 Goldsmith was drilling below 5,371 ft. after topping the Georgetown lime at 5,097 ft. The well is a south offset to the discovery, Delta Drilling et al 1 Goldsmith, in the S. G. Purse Survey.

Drilling activity in East Texas is scattered throughout the district. Thirty-two wildcats are carried on the active list. Chapel Hill, Coke, and Hawkins pools claim the bulk of the field drilling. The deepest drilling operation is in Bowie County, where P. D. Bowlen 1 A. L. Simms, 7 miles southwest of New Boston, was cutting out drill stem at 8,609 ft. In Nacogdoches County, the Texas Co. 1 G. W. Strahan had drilled to 9,259 ft., but was perforating casing opposite various zones which showed porosity on electrical log.

EAST TEXAS COMPLETIONS

Fields

Chapel Hill, Smith County: Chapel Hill Gas 1 Mobley, M. Ariola Sur., flowed 84 bbl., perf. 8,176-8,262 ft., acid 4,000 gal., T.D. 8,310 ft.

Hawkins, Wood County: Humble Oil & Ref. 9-B L. A. Bryan, M. A. Esparcia Sur., elev. 453 ft., flowed 286 bbl., pay 4,832 ft., Woodbine sand, T.D. 4,848 ft.

APPALACHIAN FIELDS

Majority of Activity Resumed in Flooded Areas of Eastern Fields

PITTSBURGH, Pa.—Conditions improved in all of the flooded areas of the lower eastern fields and much work has been resumed. None of the deep tests reached critical horizons during the week. Work in Southwest Pennsylvania was uneventful as was also in West Virginia.

SOUTHWEST PENNSYLVANIA

On Chestnut Ridge in South Union Township, Fayette County, New Penn Development Co., William E. Snee et al were drilling at 5,850 ft. in 2 Indian Creek Coal Co. Peoples Natural Gas Co. recovered the lost tools in 1 Walters at 6,251 ft. and were resuming after being delayed with engine repairs.

On Laurel Ridge in Ligonier Township, Westmoreland County, New Penn Development Co. et al resumed drilling the deep test on the Eleanor and John Beck farm and reached 7,246 ft. In Maryland, William E. Snee et al were making progress below the former bottom of old 1 Speicher on the Accident dome in Garrett County and reached 5,370 ft.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Kiskiminitas Township: Apollo Gas Co. 1 A. J. Deabenderfer, 38,000 cu. ft. gas from Murraysville, Hundred-foot and Tiona sands, T.D. 3,437 ft.

Apollo Gas Co. 1 Leechburg Collieries, 149,000 cu. ft. gas, Tiona sand 2,600 ft., gas 2,601 ft., T.D. 2,650 ft.

South Bend Township: John Wray et al 1 Fred Myers, 293,000 cu. ft. gas, Bradford sand 3,159-95 ft., gas 3,161-79 ft., T.D. 3,225 ft.

Westmoreland County, Upper Burrell Township: Equitable Gas Co. 3278 L. H. Cowan, small gas well, Big Injun 1,083-1,400 ft., Hundred-foot 1,725-1,873 ft., Speechley Stray 2,910-34 ft., Speechley 3,053-3,112 ft., gas 3,065 ft., Tiona 3,183-98 ft., Sheffield 3,309-37 ft., shot Speechley, T.D. 3,802 ft.

WEST VIRGINIA

In Union district, Pleasants County, the test of Benedum & Trees on the W. W. Campbell farm which was shut down by high water in the Corniferous lime at 5,505 ft. has resumed operations and the flood water bailed from the hole. It should reach the Oriskany this week.

In Oceana district, Wyoming County, Godfrey L. Cabot, Inc. has reached 5,646 ft. in the test on the Watts Land Co., and in the Marsh Fork district of Raleigh County the Columbian Carbon Co. was drilling at 5,778 ft. in the deep test on the Rowland Land Co.

WEST VIRGINIA COMPLETIONS

Boone County, Ceredon district: Pond Fork Oil & Gas Co. 21 fee, dry through brown shale, elev. 1,168 ft., Big lime 2,210 ft., T.D. 4,850 ft.

Clay County, Buffalo district: Pittsburgh & West Virginia Gas Co. 7890 Elk River Coal & Lumber Co., 164,000 cu. ft. gas through Injun sand, T.D. 2,261 ft.

Gilmer County, Glenville district: Phillip Lemon 2 J. W. Keith, 34,990 cu. ft. gas, Big Injun sand, T.D. 1,835 ft.

Jackson County, Ravenswood district: Columbian Carbon Co. 2 B. F. Weekley, dry, salt sand 1,273 ft., show oil 1,263-67 ft., water 1,285 ft., T.D. 1,290 ft.

Ritchie County, Grant district: Benedum & Trees 2 L. J. Rinehart, 622,000 cu. ft. gas Maxton sand, elev. 826 ft., Maxton 1,522 ft., T.D. 1,531 ft.

West Virginia Investment Co. 28 Joseph Parks, dry, Maxton 1,611 ft., Big lime 1,681 ft., Injun 1,820 ft., T.D. 1,931 ft.

Lincoln County, Jefferson district: Blue Gas Co. 1 Mark Plumley, 294,000 cu. ft. gas, brown shale, T.D. 4,056 ft.

Upshur County, Banks district: Cumberland & Allegheny Gas Co. 321 E. J. Smallridge, very small gas well, Riley sand, T.D. 4,025 ft.

Warren district: Pittsburgh & West Virginia Gas Co. 7859 Enoch Hinzman, dry, Big lime 1,624-1,716 ft., show oil, gas and water 1,707 ft., Big Injun 1,716-1,873 ft., Squaw 1,877-99 ft., Gantz 1,919-2,063 ft., Fifth 2,443-71 ft., Benson 4,364-69 ft., T.D. 4,658 ft.

ORISKANY GAS FIELDS

Kanawha County, Union district: Godfrey L. Cabot, Inc., 1066 R. E. Beane, 239,000 cu. ft. gas which blew down to 67,000 cu. ft., Corniferous lime 4,685 ft., Oriskany 4,780 ft., shot 4,792-4,802 ft., T.D. 4,835 ft.

Putnam County, Union district: Godfrey L. Cabot, Inc., 1075 Eva Carney, 1,400,000 cu. ft. gas, Corniferous lime 5,111 ft., Oriskany 5,212 ft., gas 5,219-24 ft., T.D. 5,278 ft.

MICHIGAN

Active Development May Follow Discovery in Missaukee County

SAGINAW, Mich. — Possibility that Missaukee County's Aetna Township will be one of the centers of oil development in Michigan this year was seen by oil men as the result of heavy initial production from the second well drilled in an area "discovered" last fall. The new well, Gordon & Rowmore Corp. 1 Reams, in Section 26, came in Thursday with a reported flow of 67 bbl. an hour. The wildcat is ½ mile west of 1 Blue, the discovery well.

Six other producer completions were reported last week in Michigan oil fields while three operations were halted as dry holes. Aside from the Missaukee find, interest attached to Smith Petroleum Co. 2 Ralph in Section 8 of Fork Township, Mecosta County, completed for 424 bbl. a day, with aid of acid treatment, and in a deep test of small production in Section 25 of Franklin Township, Clare County. That well, drilled by Freeman Oil Co., was averaging 13 bbl. a day from 4,851 ft. Meanwhile, the steady unspectacular growth of Bay County's Kawkawlin field proceeded with Gulf Refining Co. bringing in 1 Philip in Section 34 with a reported production on pump of 39 bbl. the first 12 hours after acid treatment.

Sun Oil Co. completed a small producer in the old Beaverton-Gladwin district, and other small wells were developed in the Adams-Arenac and Bloomingdale-Van Buren fields. Two wildcat tests in Kent and Van Buren counties were dry holes.

The state Conservation Department granted Sun Oil two permits for new tests in Osceola Township, Osceola County, one to Smith Petroleum for a test in Homer Township, Midland County. The rest of the week's total of five went to Socony-Vacuum Oil Co. for drilling in Bangor-Van Buren, and to P. K. Degenther of Grand Rapids for the Montery-Allegan test.

MICHIGAN COMPLETIONS

Arenac County, Adams Township: Ervin Major 2 Adams, C SE NE 36-19n-3e, pumped 30 bbl. in week, after acidizing, T.D. 4,271 ft.

Bay County, Kawkawlin Township: Gulf Refining Co. 1 Philip, C S½ NE NW 34-15n-4e, pumped 39 bbl. first 12 hr., acidized, T.D. 2,936 ft

Clare County, Franklin Township: Freeman Oil Co. 1 Yeager, C NE SE SE 25-20n-5w, 13 bbl., acidized, T.D. 4,851 ft.

Gladwin County, Beaverton Township: Sun Oil Co. 2 Wright, C E½ SW SW 26-17n-2w, pumped 30 bbl., acidized, T.D. 3,901 ft.

Kent County, Byron Township: Dapar Oil Co. 1 Porter & Klinge, SE SW SE 26-5n-12w, wildcat test, dry, T.D. 1,797 ft.

Mecosta County, Fork Township: Smith Pet. Co. 2 Ralph, C S½ NW NW 8-16n-7w, 424 bbl., acidized, T.D. 3,839 ft.

Ottawa County, Zeeland Township: E. W. Leeder 1 Jannes & Palmbos, SE NE NE 32-5n-14w, dry, T.D. 1,550 ft.

Van Buren County, Bloomingdale Township: James H. Conant 2 Banks, NE SE SE 11-1s-14w, 30 bbl., some salt water, acidized, T.D. 1,280 ft.

Geneva Township: Harris Oil Co. 1 Schmidt-Miller, SW NE SW 31-1s-16w, wildcat test, dry, T.D. 1,056 ft.

LOUISIANA GULF COAST

First 1943 Oil Field Opened In Assumption Parish

NEW ORLEANS, La.—The first oil discovery for the new year in the Gulf Coast area of Louisiana goes to the credit of George H. Echols, independent operator and drilling contractor of Houston, Tex., whose wildcat 1 Kessler & Sternfels, in the Napoleonville district of Assumption Parish, is showing for a good producer. The hole was bottomed at 10,474 ft., at which depth the drill pipe stuck. The hole was cleaned, and 7-in. casing was set at 9,170 ft. Perforations were made at 9,030-39 ft. After being swabbed the well started cleaning. It then began flowing at an estimated rate of 192 bbl. through ⅛-in. choke, with tubing pressure of 1,430 lb. and casing sealed. Testing operations were still under way as the week closed.

The Echols discovery comes close on the heels of Gulf Refining Co. 1-E Haas-Hirsch, which opened a new gas and distillate pool in the Krotz Springs area of St. Landry Parish, last month and was completed 2 weeks ago. It is on the northeast flank of the Napoleonville dome, in a small tract farmed out by Tide Water Associated Oil Co.

After futile efforts to clean out the hole, drilled to 8,241 ft., Texas Co. junked and abandoned 9 Jefferson Island Salt Dome Mining Co., in the Jefferson Island field of Iberia Parish. First the packer tool was lost in the hole. The crew milled in 2½-in. tubing to 8,103 ft., only to lose the mill and swab. An attempt to mill a window in the casing at 8,050 ft. failed. Milling on the junk to 7,995 ft. failed to recover the fish. Decision to abandon followed.

Gulf's test in the new Hayes field of Calcasieu Parish, 1-H Amoskeag Bank, yielded gas odor and no cut at 11,865 ft. It was coring as the week closed.

Jack W. Frazier's wildcat, 1 Sweet Lake Oil and Chalkley Land Co., a Stanolind Oil & Gas Co. farmout in Cameron Parish, which has been in trouble resulting from a blowout and stuck drill pipe, cut and pulled the drill pipe at approximately 4,850 ft. and began washing over the fish at that depth. The hole is at 8,760 ft., in sandy shale.

Union Sulphur Co. 1 J. P. Gueno, in the Branch area of Acadia Parish, which the operator has been trying to kill for several months, was still flowing. A 24-hour gage recorded 392 bbl. of 51-gravity distillate and 39,000,000 cu. ft. of gas. Pressure on drill pipe was 230 lb., on 7-in. casing 310 lb., and on 10¾-in. casing 320 lb. Its sister well, 2 Gueno, drilled to relieve the first, was in shale and lime shells at 10,025 ft.

LOUISIANA GULF COAST COMPLETIONS

Wildcats

La Fourche Parish: Atlantic 1 Allen Land Co., 49-19s-22e, dry at 5,986 ft.

Vermilion Parish: Union of California 1-C Louisiana Furs, Inc., 33-16s-2e, Fresh Water Bayou area, completed as gas well without gage, S.I. waiting on gage, perf. 9,950-60 ft., T.D. 11,985 ft.

Fields

Belle Isle, St. Mary Parish: Sun 2 State unit, Well 2, 19-17s-11e, dry at 11,011 ft., P.B. 5,267 ft.

Delacroix Island, Plaquemines Parish: Texas 3 Delacroix unit, Well 1, 3-16s-14e, 119 bbl. through ½-in. choke, T.P. 2,500 lb., gas-oil ratio 2,500, perf. 8,968-76 ft., T.D. 10,375 ft.

Gibson, Terrebonne Parish: Union Producing Co. A-2 Pelican, 20-17s-15e, tested gas, with some distillate through ½-in. choke, T.P. 2,850 lb., S.I. T.P. 3,150 lb., perf. 8,600-25 ft., S.I. without gage, T.D. 8,630 ft.

Jefferson Island, Iberia Parish: Texas 9 Jefferson Island Salt Mining Co., 59-12s-5e, junked and abandoned at 8,241 ft.

Leeville, La Fourche Parish: Texas 2 City of

(Continued on Page 75)

TEXAS GULF COAST

Brazoria County Wildcat Flows Mud and Salt Water in Test

HOUSTON, Tex.—Humble Oil & Refining Co. 1-B Houston Farms Development Co., in the Halls Bayou area of Brazoria County, was still an enigma as the week closed. The well, for weeks a center of interest in the upper Gulf territory, flowed salt water and mud in the latest test, and the operators were preparing to kill it. Nothing definitive has been revealed by tests thus far. This wildcat, which was expected to be carried to 14,000 ft., making it the deepest hole for oil east of the Rocky Mountains, reached 13,253 ft., when the drill pipe stuck. Fishing operations failed, and the hole was plugged back to 10,035 ft. It was sidetracked to 10,918 ft., at which depth casing was cemented. Although no promise of an oil well has been disclosed, it is said the operators believe they will at least have a gas producer. Perforations at new levels will be tried, it is understood.

Casing for a production attempt in the Wilcox formation was being set in Cities Service Oil Co. 1 F. Stephens, wildcat test a mile east of Ramsey, in Colorado County. This well, bottomed at 10,505 ft., is reported to have tested gas and distillate at about 10,250 ft. Cities Service has another wildcat under way, 1 Mrs. Jesse A. Tucker, 3 miles west of Ogburn field, in Harris County.

O. W. Killam et al 1 M. A. Dodd, 4 miles southeast of the Joyce Richardson field, in Harris County, was waiting on orders, following a 30-minute drill-stem test at 6,561-81 ft., with ¼-in. chokes at top and bottom, which produced a slight show. The crew recovered the 900-ft. water cushion and 720 ft. of salt water. The drill topped the Heterostegina at 3,110 ft., Textularia Warreni, 4,746 ft., and Hockleyensis 5,461 ft.

After reaching total depth of 12,489 ft., Superior Oil Co. of California 1 Blanche Foley, wildcat test 3½ miles west of Tamina, in Montgomery County, was junked and abandoned. The action follows fruitless fishing operations which began a month ago, when 11,414 ft. of drill pipe was dropped in the hole. This major misfortune followed one in November, when a drill collar and bit were lost in the hole. In that case the fishing job was successful.

A half interest in 27 mineral leases in the north extension area of the Stowell field, in Jefferson County, has been sold by Glenn H. McCarthy, Houston independent operator, to Phillips Petroleum Co., according to records filed in Jefferson County. Reports are to the effect that the transaction involved about $550,000. Other similar deals in that district are said to be contemplated.

TEXAS GULF COAST COMPLETIONS

Wildcats

Grimes County: H. L. Hunt 1 J. R. Yeager, A. Long Sur., 3 mi. SW of Cross, dry at 5,345 ft.

Montgomery County: Superior of California 1 Blanche Foley, H. Duncan Sur. A-163, 3½ mi. W of Tamina, junked and abandoned at 12,489 ft.

Wharton County: Skelly, Tide Water and

(Continued on Page 81)

Dual Completions

AS SAFE AND PRACTICAL
AS REGULAR COMPLETIONS

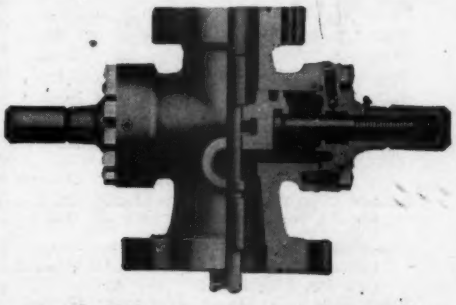
The Cameron Closed Pressure Method of Well Completion which has been employed successfully wherever well pressures present a menace to safe completions has also demonstrated its advantages in pressure maintenance projects where it is desirable to produce from two or more sands or to inject residue gas into two or more formations through a single well bore.

Throughout the entire dual completion operations—gun perforating, washing the well clean, collapsing the packer and suspending the tubing—the Cameron Ram-type Tubing Control Heads and auxiliary Cameron service units provide the ultimate in safe, dependable control.

The Cameron Type "G" Circulating Anchor Packer has been widely used in dually completed wells to assure a pressure tight seal between the producing zones. The unique feature of this rugged packer is the *self-feeding* packing element in the circulating by-pass which assures a pressure tight seal even though the seat may have been cut during washing operations.

The Lewis Transfer Valve, manufactured by Cameron under exclusive license from James O. Lewis, was designed especially for pressure maintenance service. It automatically prevents either of the zones from "loading up" with distillate.

To operators contemplating the need for either dual production or injection wells Cameron issues an invitation to make use of its engineering knowledge gained and equipment perfected through pioneering this method of well completion.



This cross-section view of the Cameron Type "LD" Ram-type Tubing Control Head clearly shows its unique mechanical features. Equipped with rams similar to those of the famous Cameron Blowout Preventer and with patented self-feeding ram packers, this head provides positive protection against loss of control during every stage of completion operations. Hanger nipple type suspension on the closed rams is illustrated, however several other types of suspension are also available.

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CAMERON IRON WORKS
OIL WELL SPECIALTIES

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KENTUCKY, OHIO, INDIANA

Henderson County Wildcat May Open Field From New Pay Zone

OWENSBORO, Ky.—The Carter Oil Co. 1 S. T. Denton, about 3 miles west of Robards in Henderson County of western Kentucky, promised last week to open a new pool from a new pay zone for the state. A 2-hour drill-stem test was made on saturated Benoist sand at 2,350-72 ft. and showed a recovery of 1,590 ft. of oil and 60 ft. of muddy oil and no water. The 1 Denton is 6 miles from other oil production and may open a considerable amount of acreage for a general play throughout the area.

This Benoist saturation is the first commercial saturation to be found in this formation in Kentucky.

Another Carter Oil Co. wildcat, the 1 Henry P. Barrett, is drilling below 2,500 ft. after making two drill-stem tests on the Aux Vases sand at 2,182-2,212 ft., the first of which showed a recovery of 40 ft. of oil and 80 ft. of oil-cut mud in 2 hours and the second showing 70 ft. of oil-cut mud and 540 ft. of salt water. It is not known whether casing will be set to test this saturation in the Aux Vases or not.

OHIO

ZANESVILLE, Ohio.—The completion of two deep wildcats, both dry, and locations made for two more were of interest last week. James Upham's deep test in Mill Township, Tuscarawas County, found the Clinton sand at 5,073-5,165 ft. with only a show of gas. The Ohio Oil test in Sugar Creek Township, Stark County, found the Clinton sand at 4,244-84 ft. with no shows of oil or gas. Brandel Producing Co. made a location for a deep wildcat test on the Warren tract in Section 24, Malta Township, Morgan County. The Industrial Gas Corp. also made a location in the same township. Both locations are to test the Clinton sand.

OHIO COMPLETIONS

Athens County, Carthage Township: Ohio Fuel 1 Mary Montle, Sec. 33, Brill, 872,000 cu. ft., T.D. 1,075 ft.

Coshocton County, Monroe Township: Upham Gas Co. 1 Fred Still, Sec. 7, Clinton, dry, T.D. 3,560 ft.

Knox County, Jefferson Township: H. E. Perkins 2 F. W. Heaton, Sec. 1, Clinton, 10 bbl., T.D. 2,850 ft.

Medina County, Hinckley Township: Ohio Fuel 1 James Crylik, Lot 25, Clinton, 104,000 cu. ft., T.D. 3,231 ft.

Morgan County, Marion Township: Ohio Fuel 2 N. M. Wood, Sec. 34, Berea, 100,000 cu. ft., T.D. 1,660 ft. (drilled deeper).

York Township: Industrial Gas Corp. 6 Matilda Eppley, Sec. 21, Clinton, dry, T.D. 4,264 ft.

Muskingum County, Wayne Township: Ohio Fuel 1 W. J. Soller, Sec. 12, Clinton, dry, T.D. 4,141 ft.

Perry County, Coal Township: Preston Oil 219 Sunday Coal Co., Sec. 36, Clinton, dry, T.D. 3,700 ft.

Stark County, Pike Township: East Ohio Gas 1 Jones Community, Sec. 22, Clinton, 213,000 cu. ft., 4,807 ft.

Sugar Creek Township: Ohio Oil 1 George Pfouts Est., Sec. 3, Clinton, dry, T.D. 4,368 ft.

Summit County, Bath Township: Wiser Oil 1 Alten R. Wells, Lot 18, Clinton, 115,000 cu. ft., T.D. 3,460 ft.

Tuscarawas County, Mill Township: James Upham 1 James A. McCollam, Lot 8, Clinton, dry, T.D. 5,254 ft.

INDIANA COMPLETIONS

Decatur County: Public Service Co. of Indiana 236 D. Schivering, NW NW 23-9n-9e, flowed 126,230 cu. ft. gas, Trenton 885 ft., T.D. 923 ft.

Public Service Co. of Indiana 234 D. Schivering, NE NE 22-9n-9e, flowed 147,500 cu. ft. gas, Trenton 882 ft., T.D. 920 ft.

La Porte County: H. B. Phillips 1 Mary Fritzen, SE NE NE 7-37n-2w, dry at 1,528 ft., Trenton 1,425 ft.

Posey County: Superior 1 J. W. Carr, NW NE SW 29-4s-13w, pumped 33 bbl. oil and 132 bbl. water, milled casing 1,885-90 ft., Clore 1,885-95 ft., T.D. 2,963 ft., P.B. 1,948 ft.

EASTERN KENTUCKY

ASHLAND, Ky.—The eastern Kentucky spotlight swings from oil to gas this week with the report of a completion of an outstanding gas well in Martin County. Last week attention was directed to another part of the Big Sandy area when the Utilities Elkhorn Coal Corp. completed a well in Pike County near Virginia with an estimated 50 bbl. of oil production daily.

Now attention is centered on the Kentucky-West Virginia Gas Co. No. 5432 well on the Nellie Cline tract on Coldwater Fork in Martin County. This well, completed at a total depth of 1,256 ft. in Maxon, has a daily open flow of 1,979,000 cu. ft. of gas. The same company also reported the completion of two other wells.

EASTERN KENTUCKY COMPLETIONS

Floyd County: No. 703 B. L. Osborne on Branham Creek, flowed 249,000 cu. ft. gas after shot, T.D. 3,153 ft. in shale.

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SOUTHWEST TEXAS

Tynan Field Discovery Well Has Small Potential

CORPUS CHRISTI, Tex.—The Tynan field, as it has been named, was opened by Stanolind Oil & Gas Co.'s Bee County wildcat, 1 Mrs. L. Ulke, 4½ miles northwest of Tynan, in the H. H. Williams Survey. On a 24-hour potential test the well made 98 bbl. of fluid, half oil and half salt water. This was accompanied by gas of undetermined volume, as no facilities for gaging it were present. The discovery is on a block of 9,000 acres assembled by Stanolind. Early tests of the well were not encouraging. Pay was found at 4,212-13 ft., with total depth 4,572 ft.

Shell Oil Co. got gas and distillate production in its 3 Von Blucher wildcat in Jim Wells County. On a test at total depth of 7,675 ft., with perforations at 6,186-90 ft. the well yielded 40 bbl. of distillate and 1,292,000 cu. ft. of gas. The new field has been named Von Blucher.

The wildcat test, 1 Maria S. de Garza, drilled to a total depth of 7,433 ft. by Sam E. Wilson, Jr., and D. Auld 2¾ miles east of La Gloria in Jim Wells County, was junked and abandoned after drill pipe stuck and was twisted off. No results were obtained by a series of side-wall cores in Auld, Carter & Coquat 1 Schorre Bors, 5 miles south of Runge, in Karnes County, and the wildcat was abandoned at total depth of 8,005 ft.

Sam E. Wilson promptly started another wildcat test near the site of his misadventure. It is 1-A Maria S. de Garza. Other wildcats staked in the lower Gulf area are Blanco Oil Co. and A. Buchanan Co. 1 Eliza Moses Cook, in the W. C. McGill Survey, Bee County; Bridwell Oil Co. 1 George A. Ray, 3 miles east of Beeville, Bee County; Phillips Petroleum Co. 1 William Huermann, 5½ miles east of Robstown, Nueces County.

The South Texas area came through with its customary cluster of wildcat failures, six of them. But that did not dampen wildcatting ador, for five new locations were staked: Sun Oil Co. 3-A East, Santo Domingo de Arriba grant, Jim Hogg County; Humble Oil & Refining Co. 1 Donata Benavides et al, 3 miles north of Pescadito, Webb County; M. L. Massingwell 1 Watkins, 5 miles southwest

of the Adami field, Webb County; Dulup Oil Co. 1 A. M. Bruni, a mile southeast of Blas Uribe field, and Government Wells Oil Co. 1 G. G. Flores estate, 2½ miles west of the Mirando Valley field Zapata County.

Sun 2-C Laurel, in La Sal Colorado grant, Starr County, extended the North Sun field about two-fifths of a mile to the west of former production. Its initial production is 52 bbl. through 9/64-in. choke. Another Sun well, 1-C Garcia Land & Livestock Co., in Ygnacio Trevino porcion 97, Starr County, is in process of extending the Frost field 1,320 ft. to the northeast. A test recorded a flow of 24.8 bbl. of oil in 24 hours.

SOUTH CENTRAL TEXAS COMPLETIONS

Wildcats

Bastrop County: Marts & Beaven 1 C. A. Anderson, Michael Greer Sur., 5 mi. W of Cedar Creek, junked and abandoned at 3,248 ft.

Dimmit County: W. J. Walton et al 1 McKnight estate, I.&G.N.R.R. Sur. 23, A-819, 4 mi. SW of Carrizo Springs, dry at 2,985 ft.

SOUTH TEXAS COMPLETIONS

Wildcats

Duval County: Standard of Texas 1 F. Smith, Charco Redondo Sur., 1 mi. W of Tarancahuas field, dry at 6,025 ft.

Jim Hogg County: Sun 6 S. K. East, Santo Domingo gr., 11 mi. SE of Randado, dry at 4,904 ft.

McMullen County: Highland Oil Co. 1 R. D. Cousins, G. W. Tindoll Sur., 2 mi. E of Loma Alta field, dry at 2,971 ft.

Starr County: D. C. DeWitt 1 F. S. de Guerra, 3 mi. SW of Buena Vista, Tex., dry at 1,300 ft.

Sun 1 Starr County Land & Cattle Co., Sur. 46, 2 mi. S of Las Isles, dry at 5,120 ft.

Webb County: H. H. Weinert and A. B. Bauchman 1 G. Guerra, Sr., W. M. Meyer Sur. 146, A-1583, 2½ mi. NW of West Cole field, dry at 2,772 ft.

Fields

Cadena, Duval County: Taylor Refining Co. 1 G. Garcia, Sur. 306, 4 mi. W of San Diego, 56 bbl. through ¼-in. choke, jetting, T.D. 6,521 ft., P.B. 4,032 ft.

No. 2 E. E. Cadena, Calletano Rios Sur., A-1027, 195 bbl. through 3/16-in. choke, T.P. 250 lb., T.D. 4,600 ft.

Colorado, Jim Hogg County: Humble 8 T. T. East, Santo Domingo de Arriba gr., dry at 3,109 ft.

Sun 6-B T. T. East, 33 bbl. pumping, T.D. 3,034 ft.

North Sun, Starr County: Sun 2 C. Laurel, La Sal Colorado gr., 52 bbl. through 9/64-in. choke, T.P. 960 lb., C.P. 860 lb., gas-oil ratio 884, T.D. 4,552 ft.

Oakville, Live Oak County: Henderson Coquat 2 Leroy New estate, James McGloin Sur., 36 bbl. through ⅛-in. choke, T.P. 0, lb. C. P. 440 lb., T.D. 2,746 ft.

Rincon, Starr County: Humble 7 San Antonio Loan & Trust Co., dry at 4,130 ft.

Ulrich, Starr County: D. C. Bintliff 1 M. M. Garcia, Josefa Benavides, Por. 91, dry at 4,078 ft.

Washburn, La Salle County: Quintana Petroleum Corp. 17 South Texas Syndicate, C. Sullivan Sur., dry at 5,705 ft.

LOWER GULF COAST COMPLETIONS

Wildcats

Bee County: Stanolind 1 Mrs. L. Ulke, H. H. Williams Sur., 4½ mi. NW of Tynan, 49 bbl. through 5/32-in. choke, T.P. 1,300 lb., C.P. 1,700 lb., gas-oil ratio 14,224, perf. 4,212-13 ft., T.D. 4,572 ft., discovery well.

Jim Wells County: Kirkwood & Morgan 1

(Continued on Page 77)

ILLINOIS FIELD REPORT

Production Opened From Levias Lime in Friendsville Field

MATTOON, Ill.—The Magnolia Petroleum Co. made a successful drill-stem test on the Levias lime at a total depth of 2,668 ft. last week at its 1 Amy Newkirk, NE NW NE 34-1n-13w. The recovery on the test was 2,008 ft. of clean oil and 60 ft. of drilling mud. Located about 1½ miles southwest of Friendsville, the 1 Newkirk opens a large area which shows possibilities of large production from the new pay.

Production in this area up to the present time has been from the Biehl sand at approximately 1,800 ft. The area, called the Friendsville pool, was discovered several weeks ago.

Nash Redwine 1 E. M. Randolph, SW SW SW 27-3s-3e, in the Game Farm area of Jefferson County, is showing for the best producer yet completed in the area. The well is showing for a production rate of about 600 bbl. of oil a day from the Aux Vases sand at 2,755-77 ft. The same operator has one drilling well active and three additional locations, all in 34-3s-3e, southeast of the Game Farm.

Adams Oil & Gas Co.'s important Devonian test, 10-D Pugh, NW SE 29-4n-1e, in the old Patoka pool of Marion County, is shut down after swab tests of the Devonian lime. No gage has been released. The well has been drilled as a tight hole and no information has been released by the company since it encountered good Benoist saturation and started ahead for the Devonian. A company spokesman, however, stated that the well did not flow as had been previously reported.

No estimate of production was made by the company, which explained that this was awaiting testing developments. Good Devonian production from this well would revive activity in Marion County which has been on the decline for several months.

Hopes for Devonian production in Madison County disappeared last week with the failure of tests at Kingwood Oil Co. 1 John C. Niggli, NE NE NE 29-5n-5w, in the northeast part of the county and about 8 miles northeast of the St. Jacob pool. The 1 Niggli has tested only salt water. Casing was perforated at 1,872-82 ft. and then the well received acid treatments of 1,000 and 2,000 gal When no oil show was found the well was shut down and will probably be abandoned according to reports from the company. However, saturation encountered in the Pottsville sand at 570 ft. may be given a test. The well was drilled to a dry Trenton lime before it was plugged back to the Devonian where a drill-stem test recovered 35 ft. of oil and 90 ft. of heavily oil-cut mud.

ILLINOIS COMPLETIONS

Wildcats

Jefferson County: Byars & Ellison 1 Jeff O. & G., SE SW NE 32-3s-2e, dry at 2,766 ft., Aux Vases sand 2,534 ft., Ste. Genevieve 2,592 ft., St. Louis 2,758 ft.

Wayne County: Deep Rock 1-A Atkinson-Windland, NE SW 12-2s-6e, pumped 214 bbl. oil and 14 bbl. water, acidized, McClosky 3,315-16 ft., T.D. 3,374 ft., P.B. 3,348 ft.

Schulman Bros. 1 Reed, SE NW 29-1s-7e, dry at 3,273 ft., Glen Dean 2,643 ft., Aux Vases sand 3,167 ft., Ste. Genevieve 3,212 ft., McClosky 3,268 ft.

White County: N. E. Marshall 1 Justice, SE NW NE 20-6s-8e, dry at 3,305 ft., Aux Vases 3,091 ft., Ste. Genevieve 3,119 ft., McClosky 3,194 ft.

Williamson County: Dick Walton 2 Andres, NW NW SE 9-9s-2e, dry at 1,689 ft., Palestine 1,331 ft., Menard 1,484 ft., Waltersburg 1,586 ft., Tar Springs sand 1,655 ft.

Fields

Akin, Franklin County: Seaboard 7 U. S. Coal & Coke, N½ NE NW NE 23-6s-4e, dry at 2,863 ft., Tar Springs sand 2,494 ft., Glen Dean 2,564 ft., Hardinsburg sand 2,592 ft., Cypress sand 2,854 ft.

Belle Rive, Jefferson County: Mohawk Drlg. 1 Waters-Hopkins, NE NE 27-3s-4e, pumped 280 bbl., acidized, McClosky 3,078-88 ft., T.D. 3,091 ft.

Bible Grove, Clay County: Texas 4 Landwehr, SE NW NW 9-5n-7e, pumped 9 bbl., shot 2,489-99 ft., Cypress sand 2,478-90 ft., T.D. 2,500 ft.

Blairsville, Hamilton County: Texas 3 H. M. Ernst, SW NW NW 21-4s-7e, pumped 202 bbl., shot 3,271-81 ft., Aux Vases sand 3,262-77 ft., T.D. 3,291 ft., P.B. 3,285 ft.

Bluford, Jefferson County: Gulf Refining 1 Johnson-Gentle, N½ SW NW 1-3s-4e, pumped 33 bbl. oil and 2 bbl. water, acidized, McClosky 3,102-7 ft., T.D. 3,113 ft.

Clay City, Wayne County: Pure 1 Riggs Consol., SE NE SW 2-1n-7e, pumped 205 bbl., natural, Aux Vases sand 2,932-55 ft., T.D. 2,965 ft.

Covington, Wayne County: Deep Rock 1 J. H. Sidwell, SE NE 31-1s-7e, dry at 3,245 ft., Aux Vases sand 3,118 ft., Ste. Genevieve 3,185 ft., Levias 3,194 ft., McClosky 3,244 ft.

Dundas, Jasper County: Gulf Refining 1 Mamie Acklin, SW SW 20-6n-10e, pumped 14 bbl. oil and 2 bbl. water, acidized, McClosky 2,840 ft., T.D. 2,856 ft.

Johnsonville, Wayne County: Pure 1 Ada Spicer, SE SW 8-1s-6e, pumped 351 bbl., shot 3,012-29 ft., Aux Vases sand 3,009-30 ft., T.D. 3,235 ft., P.B. 3,035 ft.

Noble, Richland County: Pure 1 P. H. Harrell, NW SW SE 26-4n-9e, pumped 50 bbl. oil and 3 bbl. water, natural, Cypress sand 2,539 ft., T.D. 2,586 ft.

Omaha, Gallatin County: Carter 1 P. Gregg,

(Continued on Page 78)

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Wildcats in Three Counties Are Prospective Pool Openers

KANSAS gained three new oil pools over the past week with other wildcat wells showing oil. Completions for the week were up again with 13 oil wells and 18 dry holes finished.

In Phillips County of northwestern Kansas, Cities Service Oil Co. 1-C Hansen, SW SW SE 14-5-20w, filled 3,300 ft. with oil in 12 hours through casing perforations at 3,360-70 ft. in Lansing-Kansas City lime. Drilled to 3,799 ft., formation tops were Arbuckle dolomite at 3,595 ft. and pre-Cambrian from 3,725-99 ft. The well is located 2 miles northeast of the Ray pool, which produces from the Lamotte sand and Arbuckle lime. Operators were preparing for completion tests.

Three miles east of the northern portion of the Fairport pool in Russell County, Dickey Oil Co. et al 1 O. C. Eulert, SW NW 26-11-15w, was showing for a new pool. There was oil in the hole but not production tests had been made on last report. Saturation was found in Topeka lime topped at 2,700 ft., with a good show at 2,732-46 ft. Lansing lime was at 2,995 ft., and Arbuckle at 3,332-35 ft. Operators were preparing to acidize the Arbuckle formation.

In Pratt County, 2 miles north of Iuka and 2 miles west of the new Carm pool, Skelly Oil Co. 1-B Knop, SW SW SE 25-26-13w, filled 3,300 ft. with oil in 12 hours, natural, from a total depth of 4,341 ft. Oil was coming from the Arbuckle at 4,339-41 ft. The oil tested 42-gravity at 74°

New fields named at the recent meeting of the Kansas Nomenclature Committee included the following: Harrison pool, Barton County, discovered by Palmer Oil and Mid-Continent Petroleum 1 Harrison, NW NW NE 18-20-13w, which had a temporary productivity of 51 bbl. in Arbuckle topped at 3,498 ft. The well is in the process of completion.

In Butler County, J. J. Lynn 1 Vandenberg, SW SE NW 35-27-6e, opened the Vandenberg pool and is in the process of completion. Pay zone was given as the Arbuckle, topped at 3,219-20 ft., total depth but the best pay was reported at 3,122-27 ft. in Kansas City lime. The well pumped 70 bbl. of oil and 10 bbl. of water in 10 hours.

In Russell County, Appleman 1 Driscoll, NE NE NE 4-15-14w, pumped 463 bbl. from Lansing-Kansas City lime at 2,985-91 ft. to open the Jerry pool.

KANSAS COMPLETIONS

Wildcats

Barton County: National and Helmerich & Payne 1 Haberman, SW SW SW 27-18-13w, dry, T.D. 3,391 ft., Lansing 3,095 ft., conglomerate 3,334 ft., Arbuckle 3,360 ft.

Ramsey Pet. 1 Everson, NE SW SW 27-17-11w, dry, T.D. 3,368 ft., Lansing 3,025 ft., conglomerate 3,293 ft., Arbuckle 3,348 ft., water 3,364.

Butler County: Adair & Morton 1 Hanson, SE SE NE 4-26-6e, dry, T.D. 2,730 ft., Mississippi lime 2,715 ft.

O. J. Connell 1 Getz, SW SW NW 33-28-6e, dry, T.D. 2,870 ft., Lansing 1,780 ft., Mississippi lime 2,814 ft.

Ellis County: Appleman 1 Gunther, NE NE SW 8-11-19w, dry, T.D. 3,699 ft., Lansing 3,337 ft., Simpson 3,662 ft., Arbuckle 3,677 ft.

Kingman County: Wilcox Oil & Gas 1 Kinert, SE NE SW 15-30-7w, dry, T.D. 4,807 ft., Florence 1,540 ft., Neva 1,870 ft., Topeka 2,710 ft., Mississippi lime 4,127 ft., Simpson 4,535 ft., Arbuckle 4,674 ft.

Saline County: Margay Oil 1 Linholm, SE NW 9-16-3w, dry, T.D. 3,545 ft., Lansing 2,200 ft., Mississippi lime 2,825 ft., Viola 3,323 ft., Simpson sand 5,309 ft., Arbuckle 3,536 ft.

Fields

Canton, North, McPherson County: Winkler-Koch 1 Cunningham, N½ NE SW 25-18-1w, dry, T.D. 2,857 ft., Mississippi lime 2,824 ft.

Chase, Rice County: Cities Service 2 McGlynn, SW NE SE 17-20-9w, pumped 372 bbl., Arbuckle 3,300-07 ft.

Drach, Stafford County: Atlantic Ref. 1-B Alpers, SW SE 7-22-12w, 3,000 bbl., pumped 15 bbl. an hr., Arbuckle 3,679-85 ft.

Stanolind 3 Scheib, SE SE 12-22-13w, pumped 301 bbl., Arbuckle 3,673-77 ft.

Eldorado, Butler County: T. S. Dustin 1 Robison, E½ E½ SW 17-25-5e, pumped 50 bbl., lime 2,503-08 ft.

Erway, Rooks County: Cities Service 1 Kirkwood, S½ NE NE 11-10-16w, dry, T.D. 3,230 ft., Lansing 3,079 ft.

Greenvale, Russell County: Continental 1 Zeman, S½ NW SW 9-15-12w, dry, T.D. 3,330 ft., Gorham sand 3,310 ft.

Greenwood, miscellaneous: Dunne Bros. 1 Christy, NE SE NW 9-25-11e, dry, T.D. 1,708 ft., Bartlesville sand 1,650 ft.

Hazel, Stafford County: W. P. Faulkner 1 Fanshier, E½ SE SE 20-21-13w, dry, T.D. 3,796 ft., Lansing 3,409 ft.

Iuka, Pratt County: Atlantic Ref. 1 Viola Tritsch, SW SE 11-27-132, dry, T.D. 4,337 ft., Simpson sand 4,331 ft.

Skelly 1 Hacker, SE NW 11-27-13w, dry, T.D. 4,450 ft., Simpson 4,321 ft.

Kraft-Prusa, Barton County: Texas 3 Radenberg, NE NW NE 5-17-11w, dry, T.D. 3,377 ft., Arbuckle 3,362 ft.

Laton, Rooks County: Max Cohen 6 Doane, S½ NE SE 34-8-16w, pumped 124 bbl., Lansing 3,129-43 ft., T.D. 3,198 ft.

Lindsborg, McPherson County: Winkler-Koch 1 Lillian, W½ NW SW 30-17-3w, pumped 459 bbl., Viola 3,761-74 ft., 3,379-81 ft., T.D.

Lost Springs, Marion County: Kuhn Bros. 2 Holub, NE SE 32-17-4e, pumped 261 bbl., Mississippi lime 2,394-2,426 ft.

Padgett, Sumner County: Continental 4 Curry, NW SW SW 26-34-2e, dry, T.D. 3,483 ft., Mississippi lime 3,449 ft.

Peace Creek, Reno County: Cities Service 3-B Keesling, SW NE SE 1-23-10w, swabbed 147 bbl. in 18 hr., Viola 3,724-48 ft.

Sinclair Prairie 3 Crandall, SW SE 14-23-10w, pumped 328 bbl. in 19 hr., Viola 3,756-70 ft.

Auto-Ordnance 1 Kremel, SW NW NW 33-23-10w, pumped 51 bbl., Viola 3,802-06 ft.

Ray, Phillips County: Cities Service 2 Kohlman, SW NE NE 33-5-20w, dry, T.D. 3,760 ft., Lamotte sand 3,658 ft.

Trapp, Barton County: Bartlett and Vernon Oil & Gas 1 Susank, NE NW 19-16-13w, dry, T.D. 3,455 ft., Arbuckle 3,445 ft.

Virgil, Greenwood County: Aikman & Braden 5-B Meyers, N½ SE SE 10-24-12e, pumped 50 bbl., Mississippi lime 1,773-79 ft.

Aikman & Braden 1 Mennonite, NW NW 11-24-12e, pumped 20 bbl., Mississippi lime 1,742-54 ft.

Silica, Barton County: J. H. Hershey 1 Galliart, SW NW 35-19-11w, 1,994 bbl., Arbuckle 3,305-12 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—Despite repeated cementing, Cities Service Oil Co. 1 Jim Cook in NW NW NW 32-65n-39w, Atchison County, Missouri, still leaks considerable water. Some observers, however, believe the well can be made to produce at the rate of 20 bbl. of oil per day from the Bartlesville sand. Other drilling deals are shaping up and new activity may be seen in the spring.

Two wells in the McLouth pool are showing for oil producers, but no potential has been established in either case. One is the Joe Apperson 1 McLaughlin in SW NW NW 4-10s-20e, Jefferson County. Mississippi lime was topped at 1,448 ft. and 850 ft. of oil rose in the hole in 12 hours when plug was drilled from 1,444 to 1,576 ft. The other is Jackson 3 McLeod in SE NW SE 5-10s-20e, Jefferson County. It topped Mississippi lime at 1,532 ft. Six-inch pipe was set at 1,536 ft. and after plug was drilled oil rose 700 ft. in 12 hours.

Louisiana Gulf Coast

(Continued from Page 70)

New Orleans, 26-21s-22e, 500,000 cu. ft. gas through ⅛-in. choke, T.P. 1,050 lb., perf. 2,930-60 ft., T.D. 10,568 ft.

Pine Prairie, Evangeline Parish: Humble 1 R. D. Guillory, 36-3s-1w, 205 bbl. through 9/64-in. choke, T.P. 1,125 lb., gas-oil ratio 962, perf. 7,530-38 ft., T.D. 8,771 ft., P.B. 7,560 ft.

Potash, Plaquemines Parish: Humble 62 Orleans Levee Board, 14-18s-15e, 213 bbl. through ¼-in. choke, T.P. 580 lb., gas-oil ratio 868, perf. 7,955-70 ft., T.D. 9,479 ft.

Roanoke, Jefferson Davis Parish: Union Sulphur 1-B T. A. Anding, 2-9s-4w, 148 bbl. through ⅛-in. choke, T.P. 1,600 lb., C.P. 125 lb., gas-oil ratio 1,080, perf. 8,705-13 ft., T.D. 8,837 ft., P.B. 8,717 ft.

Vinton, Calcasieu Parish: Union of California 4-G J. G. Gray estate, 33-10s-12w, 132 bbl. through ⅛-in. choke, T.P. 650 lb., C.P. 850 lb., perf. 4,982-92 ft., T.D. 6,028 ft., P.B. 5,000 ft.

West Hackberry, Cameron Parish: Stanolind 64 Kelso Bayou, 17-12s-10w, dual completion, from C sand 651 bbl. through ⅛-in. choke, C.P. 1,200 lb., gas-oil ratio 380, perf. 8,971-9,000 ft., from D sand 293 bbl. through ⅛-in. choke, T.P. 570 lb., gas-oil ratio 526, perf. 9,224-76 ft., T.D. 9,717 ft.

CANADIAN FIELDS

Alberta Production For 1942 Sets New Record

CHATHAM, Ont.—Crude and natural-gasoline production from all Alberta fields for the week ending January 4 averaged 27,734 bbl. daily, compared with 26,526 bbl. daily for the previous week and 27,285 bbl. daily for the corresponding week of 1941-42. The daily average included 26,175 bbl. of crude and 1,073 bbl. of natural gasoline from Turner Valley and 486 bbl. of crude from outside fields. There were 27 wells drilling, 2 finished, 2 testing, 1 suspended, 14 standing, 1 resumed, 2 new wells spudded, and 1 drilling license issued.

Available figures indicate that Alberta crude and natural gasoline for 1942 will set a new high of around 10,150,000 bbl. This is the seventh consecutive high record, and the first time in the history of Alberta that production exceeded 10,000,000 bbl. The 10,150,000 bbl. for 1942 compares with 9,908,000 bbl. for 1941.

Despite this increase, western Canada is faced with the probability of a critical oil shortage, due to rapidly mounting military demands together with a probable gradual decline in production due to a slump in new drilling in proven and prospective areas. In Turner Valley there are still more than 90 drilling sites available in proven territory, mostly in the West Central and northwest areas of the field; in addition to excellent prospects of extending the Madison limestone production to the south, north, northeast, and northwest. There is also a good chance that the new Devonian test in the west central area, sponsored by a group of 14 Turner Valley companies, may this year open new possibilities of development in the previously untested Devonian limestone.

At the end of 1942, only 20 of the 30 available rigs in the Turner Valley field were in use. It is estimated that to maintain the present rate of production all rigs should be continuously in use in proven territory.

New Producer Completed

The first Turner Valley producer of 1943 is Northwest-Hudson's Bay 11, LSD 15, 8-21-3w5, in North Turner Valley extension, finished at 8,390 ft. with Madison at 7,930 ft. and initial production around 30 bbl. an hour. Production tests are being continued.

Devonian Test

After some slight faulting between Belly River and upper Benton formations in the early drilling, Devonian Test 1, LSD 2, 25-19-3w5, in west central Turner Valley definitely got the upper Benton contact at 2,720 ft. and entered the Highwood sand at 2,910 ft. The test, which is financed jointly by a group of Turner Valley companies planning to drill through the Madison limestone to the underlying Devonian formation, is deepening below 3,994 ft. in the upper Benton.

Carseland Test Spotted

An important new wildcat test will be drilled by Shell Exploration of Alberta in the Carseland area, about 30 miles southwest of Calgary. Location has been spotted in 1-21-26w4. Location is on the south side of the Bow River, 6 miles south of Carseland, and 20 miles east of the New Ranchmen's 1 on the High River-Aldersyde structure. Shell Exploration

(Continued on Page 95)

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First New Operation Rigging Up in Elk Basin Field

DENVER, Colo.—The first new operation to get under way in the Elk Basin field, Park County, Wyoming, since the Minnelusa Oil Corp. made a discovery in the Tensleep horizon last November is rigging up in the Ohio Oil Co. 4 Mack OPC-4, SE SW SE 30-58n-99w. It is rigging up at 2,830 ft. to deepen to the Tensleep. The Minnelusa discovery, which flowed 80 bl. an hour through a bean on the tubing, is in a large fault block at the southeastern end of the field. The Ohio test is approximately ⅛ mile to the northwest, but in another fault block and still some distance to the southeast of the field proper where more than 11,000,000 bbl. of light oil have been produced from upper horizons. The Ohio 4 Mack was completed early in 1938 as a gas well in the Frontier. Four wells in the Frontier have been completed in past years in this fault block, most of them coming in as nominal gassers and turning to oil.

The Kerlyn Oil Co., of Oklahoma, has taken over the lease block and interests of the Minnelusa Oil Corp. and Broderick & Gordon on the El Dorado structure in Boulder County, Colorado, and will drill deeper in 1 Borra, SE NE SW 5-1s-69w, which was shut down at 9,264 ft. last November in dry Lakota sand. The well originally was drilled to 6,381 ft. in 1939 by the Continental Oil Co., at which depth it was believed to be through the Hygiene. When deepened into the Lakota by the Minnelusa company, several shows of oil and gas were encountered, but no tests were made of these with the mud pressure off. The new operator has gone back into the hole and will core through the Lakota to the top of the Morrison. Then, depending upon the results in that formation, it will set a series of 7-in. liners at the various horizons where shows were reported, perforate and test with tester on 2½-in. tubing. The only casing in the well is 427 ft. of conductor pipe.

Plans of the Ramsey Petroleum Corp. to drill one or more additional wildcats in northeastern Colorado are temporarily held in abeyance and the projected tests will not be drilled before spring and possibly later, depending upon developments in the meantime. The rig and tools used in drilling 1 Graham in the Buckingham district in Weld County, which recently was abandoned, have been stacked at that well awaiting future plans.

General Petroleum 1 Whitaker, SW SE NE 6-16n-68w, Horse Creek structure, southeastern Wyoming, ½ mile south of its discovery in the Lakota, is not showing up so well, but is continuing to the Sundance. It is coring in gray sand at 5,688 ft. It had water in the Lakota which was topped at 5,612 ft.

Santa Rita Oil & Gas Co. 1 Clark, C SW SW 34-35n-6w, Cut Bank field, last week reported a completion, bailing 12 bbl. in 14 hours, failed to prove commercial and has been abandoned.

Superior Oil Co. 1 Government, deep test on Douglas Creek, Rio Blanco County, Colorado, joint with Continental Oil Co. and Union Oil Co. of California, has shut down for the winter after setting the 8⅝-in. on bottom at 7,313 ft.

WYOMING COMPLETIONS

Horn Valley, Carbon County: Glen Swartout 1 James Horn, NE NW SW 22-22n-78w, T.D. 1,700 ft., in Morrison shale, P.B. to 830 ft. and tested dry, tops Muddy, 920 ft.; Dakota, 1,000 ft.; Lakota, 1,055 ft.; Morrison 1,080 ft.

Pilot Butte, Fremont County: Broderick & Gordon 1 Fidelity Trust, CEL SW SW 27-3n-1w, T.D. 6,297 ft., in Tensleep, P.B. to 3,533 ft., and perf. in Muddy sand at 3,293-3,300 ft., and completed for 12,500,000 cu. ft.

Spring Creek, Fremont County: F. E. Hintze 1 Government, SE NW NW 7-28n-92w, T.D. 1,195 ft., P.B. to 1,118 ft. and tested dry in the Frontier.

MONTANA COMPLETIONS

Cut Bank, Glacier County: Trigood Oil Co. 3 Tribal-231, SE SE SW 30-32n-5w, T.D. 3,047 ft., no Sunburst, Cut Bank 2,993-3,045 ft., main pay 3,033-45 ft., shot, swabbed 167 bbl. in 15 hr.

Kevin-Sunburst, Toole County: Texas Co. 16 Bruin, NE SE SE 9-35n-2w, T.D. 1,627 ft., contact 1,622-27 ft., acid, pumped 40 bbl. first 17 hr.

Leone Letts 9 Kalispel-Kevin, SW SW NW 19-35n-1w, T.D. 1,513 ft., contact 1,499-1,513 ft., acid, on 10-day test averaged 15 bbl.

O. I. De Schon 2 Davidson, NW NE NE 28-35n-3w, T.D. 1,760 ft., dry.

J. H. Agen 6 Goeddertz, SE SW NE 16-35n-3w, T.D. 1,976 ft., contact 1,791 ft., acid, pumped average 6 bbl. on 10-day test.

Permian Basin, Panhandle

(Continued from Page 66)

3,385 ft., flowed 20 bbl., pay 3,630 ft., T.D. 3,680 ft., lime.

Red Lake, Eddy County: Acrey & Screy 3 State, SW NE SW 36-17-27e, elev. 3,601 ft., pumped 8 bbl., pay 450 ft., T.D. 500 ft., lime.

Square Lake, Eddy County: Etz Oil 3 A. N. Etz, NW SE 25-16-30e, elev. 3,819 ft., flowed 160 bbl., natural, pay 3,020 ft., T.D. 3,085 ft., lime.

Sanders Bros. 9 Evans, SW NE 33-16-30e, elev. 3,744 ft., flowed 188 bbl., pay 2,930 ft., shot 190 qt., T.D. 2,960 ft.

Sanders Bros. 12 Evans, NW NE 33-16-30e, elev. 3,741 ft., flowed 40 bbl., pay 2,870 ft., shot 210 qt., T.D. 2,937 ft.

PANHANDLE COMPLETIONS

Carson County: Skelly Oil 166 Schafer, NW NE Sec. 197, Blk. 3, I.&G.N. Sur., elev. 3,142 ft., pumped 438 bbl., pay 3,020 ft., dolomite, shot, T.D. 3,100 ft.

Gray County: Phillips Pet. 1 Wray, SE SE NW Sec. 142, Blk. B-2, H.&G.N. Sur., elev. 3,233 ft., dry, T.D. 3,380 ft.

Hutchinson County: J. M. Huber Corp. 26 Weatherly, SW NW Sec. 25, Blk. Y, A.&B. Sur., elev. 3,131 ft., pumped 430 bbl. natural, pay 3,030 ft., T.D. 3,087 ft.

Skelly Oil 9-A Herring, 2,310 ft. from N, 1,542 ft. from W of E 3,011 acres of Almaguel Sur., elev. 3,245 ft., pumped 182 bbl., pay 3,119-42 ft., T.D. 3,150 ft.

Skelly 1 Crosby-Hatcher, NW NW NW Sec. 3, Blk. M-24, T.C.R.R. Sur., elev. 3,353 ft., pumped 206.4 bbl., pay 3,260-91 ft., acid. 3,000 gal., T.D. 3,300 ft.

Moore County: Phillips Pet. 1 Harrison, 2,510 ft. from N and E lines Sec. 228, Blk. 44, H.&T.C.R.R. Sur., elev. 3,620 ft., 22,500,000 cu. ft. gas, pay 2,950-3,230 ft., P.B. 3,300 ft., T.D. 3,332 ft.

West Central Texas

(Continued from Page 68)

& Reynolds 1 Allen & Ritchie, SE cor. M. E. Conatser Sur. A-1461, 2,750,000 cu. ft. gas, pay 1,450-68 ft., T.D. 1,471 ft.

Avoca, North, Jones County: Phillips 1 Pan-Carlson, SW NW Sec. 19, Blk. 3, H.& T.C.R.R. Sur., elev. 1,506 ft., dry, T.D. 3,300 ft.

Santa Ana gas, Coleman County: Lone Star Gas 1 Jones, Mary Ann Fisk Sur., 7,000,000 cu. ft. gas, pay 2,134-85 ft., T.D. 2,206 ft.

Southwest Texas Fields

(Continued from Page 73)

Dee Daugherty, Jose Pachero gr., 1 mi. NW of Magnolia City, dry at 5,866 ft.

Shell 3 Von Blucher, 40 bbl. distillate and 1,292,000 cu. ft. gas, through 9/64-in. choke, T.P. 2,300 lb., C.P. 2,350 lb., S.I. T.P. 2,475 lb., S.I. C.P. 2,400 lb., perf. 6,186-90 ft., T.D. 7,675 ft., discovery well.

Sam E. Wilson and D. Auld 1 Maria S. de Garza, Ramon de la Garza gr., 4-110, 2¾ mi. E of La Gloria, junked and abandoned at 7,433 ft.

Karnes County: Auld, Carter & Coquat 1 Schorre Bros., Carlos Martinez Sur. A-6, 5 mi. S of Runge, dry at 8,005 ft.

Fields

Armagosa, Jim Wells County: Smith & Storey, Inc., 4 J. C. McGill, N. Gussett Sur. 98, 9,800,000 cu. ft. gas, open flow, T.D. 2,376 ft.

Midway, San Patricio County: Central Oil Co. 2 Scrivener, S.A.&M.G.R.R. Sur. 5, 210 bbl. through ½-in. choke, T.P. 1,000 lb., C.P. 1,250 lb., gas-oil ratio 1,232, perf. 6,068-72 ft., T.D. 6,125 ft.

Odem, San Patricio County: Seaboard Oil Co. 5-C J. F. Welder, J. Hart Sur., A-10, 112 bbl. through ½-in. choke, T.P. 800 lb., C.P. 800 lb., gas-oil ratio 518, perf. 5,365-75 ft., T.D. 5,477 ft.

Plymouth, San Patricio County: Plymouth Oil Co. 33-C Welder, O.W.D.D., old T.D. 5,621 ft., new T.D. 5,848 ft., 162 bbl. T.P. 1,175 lb., C.P. 1,650 lb., gas-oil ratio 525, perf. 7,161-71 ft., T.D. 7,171 ft.

Seeligson, Jim Wells County: Shell 19 L. Seeligson, Willis Millican Sur., 159 bbl. through 7/64-in. choke, T.P. 1,130 lb., C.P. 1,160 lb., gas-oil ratio 794, T.D. 6,032 ft.
through 7/64-in. choke, T.P. 900 lb., gas-oil ratio 559.

Rooke, San Patrioic County: Plymouth Oil Co. 3-E E. H. Welder, T. T. Williams Sur., 174 bbl. through 7/64-in. choke,

OKLAHOMA FIELD REPORT

Pottawatomie County Wildcat Has Large Flow From Wilcox

INTEREST of Oklahoma operators over the past week has centered in the new Wilcox strike in Pottawatomie County, 10 miles west of Shawnee. The new well is Stanolind Oil & Gas Co. and Amerada Petroleum Corp. 1 Bleeker, located in the NW SE SW of 28-10n-2e. The Wilcox sand was found at 5,877 ft.; a core to 5,885 ft. recovered well-saturated sand. On a drill-stem test at 5,873-85 ft. the well cleaned itself in 20 minutes and flowed an estimated 100 bbl. of oil an hour before being shut in for storage.

Formation tops at the well were: Checkerboard 4,280 ft., Oswego 4,960 ft., Earlsboro 5,195 ft., which had an odor of oil. A drill-stem test at 5,196-5,237 ft., open 20 minutes, recovered 310 ft. of mud and salt water along with gas at some 500,000 cu. ft. Other markers were the Hunton at 5,380 ft., Viola 5,715 ft., dense 5,763 ft., dolomite 5,810 ft. and the first Wilcox at 5,877 ft.

The well is of particular importance as it is the first significant Wilcox discovery in the area just east of Oklahoma City. It is approximately midway between Oklahoma City and the Earlsboro district and will open this vast area for further tests of the Wilcox. Nearest oil pool is Centerpoint, 4 miles to the southeast, where pay is from the Simpson dolomite and Earlsboro sand.

A new Hunton lime pool 2 miles north and west of Cromwell sand production was reported at Karlyn and Continental's 1 Scott, NW SW SW 3-10n-7e. The well flowed 20 bbl. of oil in 24 hours before being shut in for tanks. Drilled to 4,510 ft., it was plugged back to 4,210 ft. Top of Hunton was 4,182 ft.

In Tillman County, east of the Frederick pool, Kerlyn 1 Hinson, NE SE SE 33-2s-17w, swabbed 30 bbl. of oil in 19 hours after a number of perforations from 2,763 ft. to 2,962 ft. Total depth was 3,243 ft. in limy sand and operators were preparing to acidize.

OKLAHOMA COMPLETIONS

Wildcats

Atoka County: Burns Oil 1-A Kinch, NW SW SE 18-3s-10e, dry, T.D. 3,754 ft., Viola 2,697 ft., no Hunton, McLish 3,270 ft., sand 3,665 ft., water 3,861 ft.

Jefferson County: Benson Bros. 1 Trout, NE NW SW 10-7s-6w, dry, T.D. 1,625 ft., sand and shale 1,554 ft.

Kay County: Alco Valve 1 Corrigan, NW NW SE 26-26n-1e, dry, T.D. 3,122 ft., Layton sand 3,015 ft.

Lincoln County, NW of Prague: Herndon Drlg. 1 Tierney, NE NE NW 30-12n-6e, dry, T.D. 4,202 ft., Layton 2,125 ft., Prue 3,374 ft., Bartlesville sand 3,832 ft., Caney 4,080 ft.

McClain County, S of Byars: Danciger 1 Moody, NE SE 28-5n-3e, dry, T.D. 3,984 ft., Layton 2,740 ft., Hunton 3,390 ft., Viola 3,872 ft.

Noble County: Ingling & Parker 1 Levy, S½ SE SE 10-23n-1w, dry, T.D. 2,400 ft., Hoover 2,163 ft., sand 2,365 ft.

Pawnee County: V. P. Rader 1 Hawk Chief, SW NW NW 30-22n-4e, dry, T.D. 4,123 ft., Misener 4,055 ft., Simpson dolomite 4,058 ft., Wilcox 4,061 ft.

Pottawatomie County: Mid-Continent 1 Bullock, NE NE SE 7-11n-6e, dry, T.D. 3,717 ft., Earlsboro 3,623 ft.

Seminole County: Blackwell Oil & Gas 1 Fleet-Osborne, SE NE 12-5n-6e, pumped 55 bbl. 26-gravity oil, sand 1,747-1,809 ft.

Velma area, Stephens County: Lundy-Shear 1 Wilkerson, NE NW NW 16-1s-5w, dry, T.D. 2,130 ft., sand and shale to T.D.

Fields

Ardmore, Carter County: Samedan Oil 1 Bussell, NE SE SE 14-5s-1e, dry, T.D. 2,731 ft.

Cumberland, Marshall County: Pure Oil 5 Chrisman-104, SE SW SE 20-5s-7e, flowed 381 bbl. in 4 hr., pay 5,843 ft., T.D. 5,960 ft.

Guthrie townsite, Logan County: Sunray 1 Katschor, SE NE SW 7-16n-2w, flowed

(Continued on Page 95)

Illinois Fields

(Continued from Page 73)

SE SE SE 5-8s-8e, dry at 1,999 ft., Palestine 1,693 ft., Menard 1,784 ft., Waltersburg 1,880 ft., Vienna 1,933 ft., Tar Springs sand 1,978 ft.

Phillipstown, White County: Phillips 1 Kuy Kendall, N½ NE NE 25-4s-10e, pumped 38 bbl. oil and 60 bbl. water, perf. 3,074-77 ft., McClosky 3,076-81 ft., T.D. 3,891 ft.

Rural Hill, Hamilton County: Shell 8 J. F. Crabtree "B," NE NE NE 23-6s-5e, pumped 84 bbl. oil and 4 bbl. water, shot 3,097-3,114 ft., Aux Vases sand 3,076 ft., pay 3,082-94 ft., 3,101-13 ft., T.D. 3,115 ft.

Texas 5 E. Smith, NW SE SE 12-6s-5e, flowed 202 bbl., shot 3,060-80 ft., Aux Vases sand 3,060-78 ft., T.D. 3,080 ft.

Shell 6 Ventrees, NE SW SE 12-6s-5e, flowed 205 bbl., shot 3,082-99 ft., Aux Vases sand 3,066 ft., pay 3,070-3,107 ft., T.D. 3,114 ft.

St. Paul, Fayette County: H. Luttrell 4 Aukamp, SW SE SE 30-5n-3e, dry at 1,924 ft., Glen Dean 1,607 ft., Benoist sand 1,917 ft.

Luttrell et al 5 Ford, NE SW NW 31-5n-3e, dry at 1,904 ft., Paint Creek 1,884 ft., Benoist sand 1,895 ft.

Sims, Wayne County: Bell Bros. 7-A F. Fuhrer, NE NW NW 33-1s-6e, pumped 142 bbl., shot 3,027-42 ft., Aux Vases sand 3,018-36 ft., T.D. 3,045 ft.

South Lawrensce, Lawrence County: Ryan Oil 2 Schaffer, SW NE SW 27-2n-12w, pumped 25 bbl., shot 2,045-54 ft., Benoist sand 2,030-45 ft., T.D. 2,063 ft., P.B. 2,055 ft.

Stokes, White County: Pure-Carter 2 Austin Consol., SE NW NW 17-6s-9e, pumped 26 bbl., shot 2,820-33 ft., Paint Creek sand 2,819-25 ft., T.D. 2,833 ft.

Walpole, Hamilton County: Texas 5 C. Johnson, NW NE NE 34-6s-6e, gas input well, shot 3,093-3,103 ft., Aux Vases sand 3,074-3,100 ft., T.D. 3,103 ft.

Texas 2 F. R. Wilson, NE NE SW SW 27-6s-6e, gas input well, shot 3,088-3,115 ft., Aux Vases sand 3,068 ft., T.D. 3,115 ft.

Texas 2 Brown Comm., SE SE NE 34-6s-6e, dry at 3,288 ft., Cypress sand 2,764 ft., Aux Vases sand 3,090 ft., Ste. Genevieve 3,132 ft.

Texas 4 C. Johnson, NW NW SE SE 27-6s-6e, gas input well, shot 3,073-3,100 ft., Aux Vases sand 3,054-85 ft., T D. 3,100 ft.

West Frankfort, Franklin County: E. S. Adkins 1 Orient, SE SE SE 12-7s-2e, dry at 2,756 ft., Tar Springs sand 2,049 ft., Benoist sand 2,623 ft., Aux Vases 2,683 ft., Levias 2,734 ft.

Woodlawn, Jefferson County: Shell 1 A. F. Howe, SE NW SW 25-2s-1e, pumped 170 bbl., natural, Benoist sand 1,976 ft., T.D. 1,989 ft.

Butadiene Conversion

(Continued from Page 57)

vision of costs as between old and new equipment and the reasons for the selection of each one. For example, he said, the 15,000-ton plant of the Standard Oil Co. of California probably will cost less and produce more butadiene than estimated, and its construction was necessary to obtain butadiene in the Los Angeles area when it became apparent that previous plans would have to be changed because of a lack of surplus gasoline for cracking. The Standard plant will operate on butane by the Houdry process.

All the conversion projects should be completed during 1943, Mr. Brown declared, but whether they are completed on presently scheduled dates will depend entirely on the priorities granted for critical materials.

Questioned by committee members about the advisability of using petroleum for synthetic rubber in view of possible future exhaustion of oil reserves, Mr. Brown pointed out that the thermal-conversion projects will use a total of 55,000 bbl. of motor gasoline a day as charging stock, while the Houdry units will use a total of 6,000 bbl. daily for butane. The so-called permanent petroleum butadiene plants in the Rubber Reserve's regular program will use feed stocks from refineries with a total crude run of 886,000 bbl. daily, but the total amount of petroleum materials (butylenes) going into synthetic rubber from all plants will be only 11,000 bbl. daily. He compared this figure with total crude runs in the United States of around 4,000,000 bbl. daily.

After the war, Mr. Brown said, the use of gasoline as a charging stock probably will be discontinued, but he asserted that most of the petroleum butadiene plants will not have to close down after the war because of competition from natural rubber, because of the low cost at which synthetic rubber is expected to be made.

CALIFORNIA

Failure to Find New Production May Force Deeper Drilling

LOS ANGELES, Calif. — With 3 weeks of the current year gone, prospectors are viewing in retrospect the results of exploration work during the past year and attempting to look ahead to determine as far as possible what the future holds in store. Failure of prospectors to open up new fields has been reflected in drastic reductions in the state's crude-oil reserves for the past 3 years. Several new fields have been discovered during the past several years but they have not been found highly productive. The rate of discovery has been satisfactory but the quality of discoveries has been poor. As the situation now stands, prospectors are at a loss where to start prospecting work and are showing signs of anxiety. Many districts have been gone over again and again in search of some favorable indications, some as many as 15 times. There has never yet been a time to date when prospectors were so utterly at a loss of where to drill. It has been a long time since there has not been a trend to sustain a series of wildcats along a line of folding. There is no questioning the fact that more aggressive exploration work should be done but prospectors come back with an explanation they do not know where to drill. As times goes on it becomes more evident that prospectors must engage in deeper drilling even though they do not want to engage in this type of work due to casing and equipment shortage. Results of conservation work in California during the past few months definitely indicate California cannot greatly increase crude-oil production without drilling additional wells and at the same time operate on the so-called m.e.r. factor. Conditions in the Coles Levee field indicate the difficulty confronting operators if they endeavor to step up production as operators in this field are now obliged to undertake some form of unitization or gas repressuring in order to protect the field from undue depletion. Inability to agree on some form of work that will reduce gas production has forced operators to temporarily suspend production activities. The area involved is the Coles Levee field as apart from the Tupman field to the north. Production activities will be resumed again within the next day or two as a tentative program has been approved.

A check of wildcat exploration under way fails to show any unusually promising wildcats and consequently the outlook for new discoveries is not any too bright. On the law of average it is quite likely that one or more new fields will be discovered during 1943 but it remains to be seen whether they prove to be fields of importance. In the meantime, operators holding undeveloped acreage are proceeding with conservative drilling. This is especially true of San Joaquin Valley fields where operators have for several months been developing shallow zones that produce a heavy grade of crude oil. These shallow wells only show small production but with a multiplicity of completions the aggregate amount of new production added is consistently good. There have been no developments to indicate any change in the current rate of drilling and for this reason it is logical to assume that approximately 750 new wells should be finished during 1943 provided new equipment is made available.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge, South, Kern County: General Petroleum Corp. 1-A-3 fee, 3-29s-21e, pumped 46 bbl., 15.1-gravity, 4 per cent cut, T.D. 790 ft., P.B. 705 ft., completed in upper Belridge zone of Pliocene age.

Ohio Oil Co. 12 Emily Hopkins fee, 4-29s-21e, pumped 48 bbl., 14-gravity, 20 per cent cut, T.D. 840 ft., 120-mesh perf. 573-817 ft., completed in upper Belridge zone of Pliocene age.

Edison wildcat district, Kern County: General Petroleum Corp. 1 Tarabino, 6-29s-29e, dry in gray sand and shale, T.D. 3,237 ft., few spots oil sand in top of Vedder zone of Miocene age at 3,085 ft.

Kern River Front, Kern County: Westates Petroleum Corp. 41 Cauley, 16-28s-27e, pumped 125 bbl., 15.3-gravity, 3 per cent cut, T.D. 2,903 ft., 125-mesh perf. 2,723-2,883 ft., completed in Kern Front zone of Pliocene age.

Standard Oil Co. 8-9 fee, 9-28s-27e, pumped 171 bbl., 14.2-gravity oil and 33 bbl. of water, T.D. 2,800 ft., perf. 2,619-2,792 ft., completed in Kern Front zone of Pliocene age.

Standard Oil Co. 32-15 fee, 15-28s-27e, pumped 98 bbl., 14.4-gravity oil and 25 bbl. of water, T.D. 2,417 ft., 100-mesh perf. 2,243-2,413 ft., completed in Kern Front zone of Pliocene age.

Midway-Sunset, Kern County: Chanslor-Canfield Midway Oil Co. 25-1 fee, 1-32s-22e, dry in brown shale showing vertical dips, form. test 3,152-3,325 ft., recovered 27 stands mud and water, no oil, 25° dips at 4,213 ft., T.D. 5,524 ft.

North American Oil Consolidated, 40-A Lockwood, 16-32s-23e, pumped 21 bbl., 11.9-gravity, 40 per cent cut, T.D. 1,209 ft., perf. 624-1,200 ft., Reef Ridge sand 716 ft., oil sand 808-1,209 ft., Pliocene age.

Standard Oil Co. 85-27-B fee, 27-31s-23e, pumped 26 bbl., 29.6-gravity, 7 per cent cut, T.D. 3,630 ft., P.B. 3,450 ft., gusher sand 2,915 ft., Calitroleum zone completion of Pliocene age.

Mount Poso, Kern County: Chanslor-Canfield Midway Oil Co. 16 Mon, 26-27s-28e, pumped 90 bbl., 15.7-gravity, 9 bbl. of water, T.D. 1,660 ft., P.B. 1,495 ft., perf. 1,482-95 ft., completed in Vedder zone of Miocene age.

Riverdale, Fresno County: Amerada Petroleum Corp. 32-22 Alves, 22-17s-19e, flowed 209 bbl., 34-gravity, 5 per cent cut, 76,000 cu. ft. gas, T.D. 6,900 ft., perf. 6,645-50 ft., 6,560-90 ft., completed in Lawton zone of Miocene age.

Amerada Petroleum Corp. 36-23 Zanolini, 23-17s-19e, flowed 123 bbl., 43.4-gravity, 1 per cent cut, 1,874,000 cu. ft. gas, 14/64-in. bean, pressures 2,075-2,050 lb., T.D. 6,900 ft., perf. 6,820-40 ft., completed in Lawton zone of Miocene age.

Round Mountain, Kern County: D. G. Vedder, 15 Bell, 12-28s-28e, dry in gray sand, Vedder zone of Miocene age 1,998-2,003 ft. was barren gray sand, T.D. 2,004 ft.

Shale Hills wildcat district, Kern County: Continental Oil Co. 3 Mabry, 26-26s-18e, dry in gray sand, Miocene sand 1,157 ft., Kreyenhagen 3,728 ft., Eocene sand 4,358-4,463 ft., Devils Den sand 4,463 ft., Cretaceous 5,090 ft., T.D. 6,164 ft., no important showings logged.

Tupman-Coles Levee, Kern County: Richfield Oil Corp., 63-34-C Kern County Land, 34-30s-25e, flowed 875 bbl., 34.9-gravity, 0.5 per cent cut, 820,000 cu. ft. gas, two 96/64-in. beans, pressures 740/110 lb., T.D. 9,340 ft., perf. 9,145-9,335 ft., completed in Stevens sand of Miocene age.

LOS ANGELES BASIN

Shell Oil Co., Inc., is getting ready to spud in its projected deep Miocene test in the Gilmore Island section of the city of Los Angeles and actual making of hole will begin within the next day or two. The delay in getting under way in this well is attributed to the fact that Shell is making every attempt to prevent any complaint from arising as a result of drilling. This will be an electrical job and the derrick will be entirely enclosed. A high board fence has been erected around the project to keep spectators away from the scene of operations and thus enable the crew to get down to business as soon as possible. This deep test is regarded as one of the best-looking shots in the state and there is every reason to believe that Shell has an excellent chance of developing deep Miocene production. The Pliocene was exceptionally prolific in this old Salt Lake field and if the deeper formations conform with the Pliocene the Miocene can be expected to prove productive. The future possibilities of the Salt Lake field may depend upon what is found in this first well because if it fails it will mean the end of an interesting problem. If on the other hand it results in production, Shell is obligated to erect a limit height reinforced concrete building to enclose all drilling equipment. This drilling building is to be so constructed that it will be soundproof as far as possible and prevent the escape of natural gas or other odors. Future drilling, provided the first well is found productive, will be by means of directional drilling which will enable the company to extend the bottom of wells for a considerable distance around the central drilling structure. If Shell succeeds in

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getting production it is quite likely that additional acreage around the location may also be opened to production. In close proximity is the old Gilmore residential property, the Gilmore Stadium, Hollywood Baseball Park, Farmer's Market and other structures of low value. This would mean that the city council or the Los Angeles board of supervisors would be presented with a problem in deciding whether additional drilling would be permissible on adjacent acreage. There is no reason to believe that Miocene sand at Gilmore Island would prove to be limited in areal extent with the result that additional drilling on adjacent acreage should be granted.

LOS ANGELES BASIN COMPLETIONS

Coyote, West, Orange County: Standard Oil Co. 130 Murphy Coyote, 18-3s-10w, flowed 607 bbl., 29.8-gravity, 8 per cent cut, 432,000 cu. ft. gas, 42/64-in. bean, flow pressure 180 lb., T.D. 5,970 ft., perf. 5,498-5,963 ft., completed in 99 zone of Pliocene age.

Huntington Beach, Orange County: D. D. Dunlap 18 H. B., 35-5s-11w, pumped 75 bbl., 21.8-gravity, 0.5 per cent cut, T.D. 3,870 ft., perf. 3,804-44 ft., completed in middle zone of Pliocene age.

Montebello, Los Angeles County: Standard Oil Co. 97 Baldwin, 1-2s-12w, pumped 69 bbl., 17.3-gravity, 219 bbl. water, T.D. 2,900 ft., perf. 2,448-2,896 ft., completed in Baldwin zone of Pliocene age.

Torrance, Los Angeles County: Royal Petroleum Co. 13 Carson, 5-4s-11w, pumped 35 bbl., 15.1-gravity, 3 per cent cut, T.D. 3,503 ft., gravel packed perf. 3,100-3,503 ft., completed in equivalent of Ranger zone of Pliocene age.

Turnbull Canyon, Los Angeles County: Flintkote Co. 1 Turnbull, 12-2s-11w, dry in gray Pliocene sand, T.D. 3,653 ft., no oil showing logged.

Wilmington, Los Angeles County: Pongratz Petroleum Co. 2 Spring, 30-4s-13w, pumped 60 bbl., 16.9-gravity, 30 per cent cut, T.D. 3,677 ft., gravel packed perf. 3,227-3,400 ft., 3,519-3,672 ft., completed in Ranger zone of Pliocene age.

COASTAL DISTRICT

There was no change during the current week in the status of 2 Barnes of R. E. Havenstrite in the Del Valle field of Los Angeles County, but something definite may be available within another few days. Following the failure to develop commercial production in the deep zone at 9,870 ft., the operator backed up to 7,775 ft. and shot five ½-in. holes. A total of 327 sacks of cement was squeezed away behind a pressure of 5,000 lb., one of the highest pressure jobs effected in recent years. Much depends upon what is found in this well as the upper Modelo zones have failed to yield large sustained production of crude oil free from water. As a consequence, a large prolific zone would enable the operators to come out in the black and justify additional development. Well production in this field has been very irregular and the subsurface formations are so broken up that there is also a marked unconformity from well to well.

Shell got another fine well in the Ventura Avenue field last week and made good progress this week with 159 Taylor, the company's next poten-

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tial producer. For the time being, Tide Water Associated Oil Co. has suspended drilling operations at Ventura Avenue. The Lloyd Corp., headed by Ralph Lloyd, has 9 Lloyd down 9,840 ft. and should have this well ready for a test in the near future. This well is being drilled on fee-owned acreage which makes a good well very attractive especially at Ventura Avenue where substantial production is obtained. In the Rincon field, located at the extreme western end of the Ventura Avenue anticline where it plunges beneath the ocean, Chanslor-Canfield Midway Oil Co. is engaged in some remedial work on 10-C Hobson, a projected deep test which reached a depth of 10,065 ft. only to force a redrill job which has now turned into a fishing job. This well has been held up for some time and may be abandoned and a new hole started unless a speedy recovery is effected. This deep well had just reached the depth at which it should have begun to show some indication of what could be expected from the lower zone. If the present well is abandoned it is not at all unlikely that drilling may be discontinued for the time being. The deep Hobson zone was found at Rincon early last year by Chanslor-Canfield Midway Oil Co. but it failed to result in flowing production and the company decided to give the horizon a thorough test. The result of this decision is 10-C Hobson, which has run into so much trouble. In one of the earlier wells, over 1,000 ft. of oil sand was cored but even in spite of this condition the well failed to flow. This large penetration reflected a duplication of the upper zone which at times looked good. The effect of faulting in this field is still undertermined as far as the deep zones are concerned, and if a deep well can be drilled to 11,000 or 12,000 ft. the outlook might be changed. No well in the field has yet been able to reach these depths.

COASTAL DISTRICT COMPLETIONS

Del Valle, Los Angeles County: Ohio Oil Co. 5 Vasquez, 17-4n-17w, flowed 603 bbl., 39.4-gravity, 0.1 per cent cut, 3,226,000 cu. ft. gas, 24/64-in. bean, pressures 1,600/1,710 lb., T.D. 5,810 ft., 120-mesh perf. 5,713-5,807 ft., Vasquez zone 5,017 ft., Videgain zone 5,702-5,810 ft., completed in Videgain sand of Miocene age.

Oak Canyon, Los Angeles County: Western Gulf Oil Co. 1 V. B. Wickham, 32-5n-17w, flowed 227 bbl., 32.5-gravity, 3 per cent, 97,000 cu. ft. gas, 22/64-in. bean, pressure 210/1,080 lb., T.D. 7,166 ft., perf. 7,055-7,105 ft., completed in Modelo oil sand of Miocene age.

Santa Maria Valley, Santa Barbara County: Union Oil Co. 1-5 Bradley Lands, 25-10n-34w, flowed 234 bbl., 16.1-gravity, 3 per cent cut, open line, T.D. 4,869 ft., perf. 4,196-4,868 ft., completed in Monterey of Miocene age.

Eastern Kentucky

(Continued from Page 72)

Knott County: No. 5328 William Thornberry on Bates Branch, flowed 660,000 cu. ft. gas after shot, T.D. 3,377 ft. in shale.

Martin County: No. 5432 Nellie Cline, on Coldwater Fork, flowed 1,979,000 cu. ft. of gas, T.D. 1,256 ft. in Maxon.

NORTH LOUISIANA, ARKANSAS

Smackover Test in Nick Springs Field Reports Showing of Oil

SHREVEPORT, La.—Drilling activity throughout this area has been slow over the past few weeks. In the Midway field of Lafayette County, where the Southwood Oil Co. is now the sole operator, its 8 Hodnett was drilling below 1,500 ft. after receiving permission to move location to NE SE NE 13-15s-24w. However, other locations in the field are reported to be waiting on drilling orders.

Fohs Oil Co. 1 Grace, Smackover lime test in the Nick Springs field of Union County, was understood to have had a show of oil at around 5,600 ft. but was drilling ahead. Carter Oil Co.'s Union County wildcat, southeast of the El Dorado field, was below 6,200 ft. The well has reported only showings of oil so far.

A rank wildcat in Calhoun County, 4 miles northwest of the town of Moro Bay on the Ouachita River was rumored to have found a show of oil. Official information on the well has not been released. The well is Placid Oil Co. 3 Freeman Smith Lumber Co. located in the NE NE SE 14-16s-13w.

Tide Water Associated Oil Co. 1 Warren Hawk, in 16-18s-19w of the Atlanta field, blew wild when deepening work was started. The well was closed in after blowing off at an estimated rate of 25,000,000 cu. ft. of gas and some 2,000 bbl. of oil a day at 8,268 ft.

ARKANSAS COMPLETIONS

Wildcat, Bradley County: Placid Oil 2 C. H. Murphy, SE SE 28-15s-10w, dry, T.D. 6,301 ft., top Buckner anhydrite 5,354 ft.

Wildcat, Nevada County: Hunt Oil and Arkansas Fuel 1 Kirk, SW SE 33-12s-20w, dry, T.D. 4,033 ft., Travis Peak 2,165 ft., Cotton Valley 2,860 ft., Buckner 3,605 ft., Smackover 3,804 ft., porosity 3,820 ft.

Macedonia, Columbia County: G. H. Vaughn 1 Jameson-Snider, S½ NW 20-18s-21w, flowed 200 bbl., Smackover 8,902 ft., T.D. 8,948 ft.

New London, Union County: Marine Oil 6 Frost, NE NE 13-18s-12w, flowed 175 bbl. in 12 hr., perf. 5,662-86 ft., T.D. 5,925 ft.

NORTH LOUISIANA COMPLETIONS

Wildcat, Tensas Parish: Continental Oil 1 J. D. Tremble, SW SW NW 18-14n-12e, dry, T.D. 5,293 ft.

Caddo, Caddo Parish: Magnolia 44 Doan-Thigpen, Sec. 6-20n-15w, flowed 10 bbl., T.D. 1,531 ft.

Cross Lake, Caddo Parish: Sam Sklar 1 Walker-Bush, Sec. 25-18n-14w, pumped 48 bbl. Pettit 5,546-56 ft., T.D. 5,598 ft.

Bear Creek, Bienville Parish: H. L. Hunt 1-A Hodge-Hunt, SE NW 11-16n-6w, 11,500,000 cu. ft. gas, open flow, perf. Pettit 6,688-6,714 ft., T.D. 7,248 ft.

Manifest, Catahoula Parish: Jordan Pet. 1 Womack, SE SE SE 40-9n-5e, dry, T.D. 1,756 ft.

Nebo, La Salle Parish: Grubb & Hawkins 2 Coon-Wilson, SW SE SW 15-7n-3e, flowed 75 bbl. through choke, perf. 4,018-24 ft., T.D. 4,203 ft.

Pine Island, Caddo Parish: J. E. Marshall 6-A Spell, SE SW SE 29-21n-15w, pumped 180 bbl. through open tubing, acidized, T.D. 1,550 ft.

Sligo, Bossier Parish: Triangle Drlg. 2-B Kerr, Sec. 24-17n-12w, pumped 40 bbl., T.D. 3,172 ft.

Texas Gulf Coast

(Continued from Page 70)

Cities Service 1 E. J. Steeves, J. J. Dillard Sur. A-18, dry at 6,665 ft.

Fields

Amelia, Jefferson County: Humble 8 R. J. Pevito, C. Williams Sur. A-59, O.W.W.O., old T.D. 681 ft., completed as salt-water disposal well at 988 ft.

Boling, Wharton County: Danciger 1 J. B. Gary, S. F. Austin Sur. A-2, 139 bbl. pumping, T.D. 3,528 ft., P.B. 3,470 ft.

Danbury, Brazoria County: Humble 3-B Bassett-Blakely, H.T.&B. Sur. 14, 162 bbl. through ⅛-in. choke, T.P. 1,050 lb., gas-oil ratio 358, perf 5,505-30 ft., T.D. 5,919 ft.

Esperson, Liberty County: General Crude 1-B Moore's Bluff, Day Land & Cattle Co. Sur. A-517, 19 bbl. through ⅛-in. by 6-in. positive choke, T.P. 800 lb., C.P. 1,300 lb. S.I., gas-oil ratio 2,161, perf. 8,460-8,525 ft., T.D. 8,892 ft., P.B. 8,566 ft.

Magnet-Withers, Wharton County: Texas B-11 Pierse estate, A.H. Pierce Sur. A-642, O.W.W.O., old T.D. 5,552 ft., P.B. 5,542 ft., drilled out to 5,535 ft., 30 bbl. through ⅛-in. choke jetting, T.P. 200 lb., input 400 lb., gas-oil ratio 452 ft.

Maubro, Jackson County: Humble 10 Mike Strauss, A. M. Clare Sur. A-12, 65 bbl. through ⅛-in. choke, T.P. 200 lb., C.P. 425 lb. S.I., gas-oil ratio 250, T.D. 5,227 ft.

Oyster Bayou, Chambers County: Sun 13 Felix Jackson et al, J. H. Jackson Sur. A-427, 176 bbl. through ⅛-in. by 6-in. positive choke, T.P. 1,300 lb., C.P. 1,700 lb., gas-oil ratio 614, T.D. 8,370 ft., P.B. 8,326 ft.

Seabreeze, Chambers County: Sun 1 Rose Nàmes Pool, T.&N.O.R.R. Sur. A-293, dry at 10,001 ft.

Stewart, Jackson County: Texas C-1 T. N. Mauritz, George Sutherland Sur. A-75, junked and abandoned at 6,169 ft.

Stowell, Jefferson County: Glenn H. McCarthy, Inc., et al, 3 Crawford et al, R. H. Parker Sur. A-651, 178 bbl. through 9/64-in. by 6-in. positive choke, T.P. 1,600 lb., C.P. 2,000 lb. S.I., gas-oil ratio 673, perf. 8,878-88 ft., T.D. 9,205 ft., P.B. 8,900 ft.

West Mauritz, Jackson County: Barnsdall 1 A. E. Westhoff, M. L. York Sur. A-312, 126 bbl. through 7/64-in. choke, T.P. 750 lb., C.P. 750 lb. S.I., gas-oil ratio 301, perf. 5,470-74 ft., T.D. 5,477 ft.

Gulfboard Oil Co. B-1 T. N. Mauritz, M. L. York Sur. A-312, 97 bbl. through ⅛-in choke, T.P. 670 lb., gas-oil ratio 438, perf. 5,476-86 ft., T.D. 5,565 ft., P.B. 5,630 ft.

West Ranch, Jackson County: Magnolia A-244 West Ranch, Ramon Musquez Sur. A-59, location abandoned.

Among the Drilling Contractors

Parker Drilling Co. has the contract on Midstates Oil Co. 1 V. E. Lowe, in SE 5-23n-8w, the Haynesville area of Claiborne Parish, Louisiana, which was starting.

Jeff Spier, of Many, La., has the contract on a test C. D. Heff, of Dallas, Tex., was starting in NE 8-13n-12w, De Soto Parish, Louisiana. The test will seek the Travis Peak.

George Jones, of Shreveport, La., was moving in to start the Westgate-Greenland Oil Co. 1 Wesdale Corp., in NE 29-14n-11w, a 3,800-ft. wildcat in Red River Parish, Louisiana.

Noble Drilling Co. has the contract on Carter Oil Co. 3 W. A. Wright in SE 7-6n-4e, the Catahoula Lake area of La Salle Parish, Louisiana. The Wilcox zone is the objective.

John Harris Drilling Co. has the contract for Anderson-Prichard Oil Corp. and Darby Petroleum Co. 1 Henry Mooney, which was ready to start in the J. Mooney Survey A-1744, on southeast edge of a 5,000-acre block in Young County, Texas. Contract is for the Ellenburger.

Cross Drilling Co., Odessa, Tex., is the contractor on a test Union Oil Co. of California will drill in Ector County, Texas, ¾ mile east of the southeast portion of the South Cowden field. The outpost will be the 1 Mrs. E. R. Kone, C NW SW 41-42-2s-T.&P., and it is a scheduled 4,500-ft. rotary test.

Marvin Marrs, Bristow, Okla., is the drilling contractor on F. O. Akin 1 H. A. Paul, an Arbuckle lime test drilling with cable tools about a mile south of Henderson, in SW SW 15-73n-40w, in the southwestern part of Iowa. Drilling began in November and at last reports the hole was at 1,400 ft.

McCutchan Drilling Co., Dallas, Tex., has the drilling contract on the Texas Co. 2 Benefield & Singleton in the Wannop Survey, 1,320 ft. south of the company's 1 Benefield & Singleton, and 600 ft. from the east line of a 100-acre tract, in the Kildare field of Cass County, Texas. Rig was being set up.

Moran Brothers, Wichita Falls, Tex., have the contract to drill a 4,600-ft. Mississippian lime wildcat test to the Ellenburger for J. D. Hancock, of Dallas, Tex. The test will be drilled in Stephens County, Texas, 9 miles northeast of Breckenridge and 5 miles south of the Young County line. Operations are scheduled to start about January 25 with rotary tools. The test will be carried as J. D. Hancock 1 Black Brothers.

Helmerich & Payne, Inc., Wichita, Kans., and Tulsa, is the drilling contractor on Bay Petroleum Corp. 1 Bates, in SE SE NE 35-18s-13w, 9 miles northeast of the Harrison (Arbuckle) pool, in Barton County, Kansas. Surface casing has been set.

Earl F. Wakefield is the drilling contractor for W. N. Bartlett, Loren A. Crum and Earl F. Wakefield 1 Rees, a new location in C SE NW 34-17s-10w, Ellsworth County, Kansas.

Target Drilling Co. has the contract on J. W. Baldwin et al 1 Smith-Thomas, in SE SE NE 7-5s-5e, Marshall County, Oklahoma, 3 miles northwest of Madill. Operator was starting on a 3,000-ft. test.

Falcon-Seaboard Drilling Co., Houston, Tex., has started work on a well for its own account in the Pearsall field of Frio County, Texas. It is the 3 Halff & Oppenheimer, in the J. H. Gibson Survey 15.

Harry L. Edwards Drilling Co., Houston, Tex., has finished work on two contracts for Cities Service Oil Co. A semiwildcat, 1 Pierce estate, near Blessing, Matagorda County, Texas, was completed dry at about 9,000 ft. In the North La Ward field, Jackson County, 1 Chamrad was a producer. Edwards has the contract for a wildcat, 1 Annie B. Renchie, in the Millican area of Brazos County, for Phillips Petroleum Co.

Fain Drilling Co., Houston, Tex., has the contract for a Stanolind Oil & Gas Co. wildcat to be drilled in McMullen County, Texas. Fain recently completed Stanolind 2 Bonnot in the North La Ward field, Jackson County, and Continental Oil Co. 77-A Tom Slick in the Rincon field, Starr County.

Franklin & Tidemann, Ltd., Houston, Tex., will drill a wildcat, 1 Caswell, for Butcher-Arthur Co., about 5 miles southeast of Edna, in Jackson County, Texas. It is planned to carry the hole to about 6,500 ft.

Malcolm Mount is the drilling contractor on P. K. DeGenther 2 Anton Church, NW SE NW 2-3n-13w, Allegan County, Michigan.

Grey Wolf Drilling Co., Houston, Tex., is near completion of a well, Unit 21, for La Gloria Operators Committee, in Jim Wells County, Texas. After being delayed by a shutdown this contractor has resumed work on a Smackover lime test for S. A. Guiberson and J. F. Lucey, of Dallas, Tex., near Ferris, at the southern edge of Dallas County. The hole, now at 3,000 ft., is projected to go to 6,500 ft.

Whitman Drilling Co., Houston, Tex., will discontinue the contracting phase of its business for the duration of the war. Alvin D. Whitman, president and general manager, has been commissioned a captain in the Engineering Corps, and he reported January 10 for duty in the Eighth Service Command. The company is a gas producer as well as drilling contractor and its gas interests in the Edna field, Jackson County, Texas, will be under the direction of Herbert Smith, field foreman. Its office in Houston will remain open.

Harrison & Dillard, Houston, Tex., have the contract to drill Continental Oil Co. 2 Janke, in the South Roanoke field, Jefferson Davis Parish, Louisiana. As the week closed they were running pipe for 1 Stephens, a Cities Service Oil Co. wildcat test 1 mile east of Ramsey, in Colorado County, Texas. The same contractors are running a string of tools at Shell Oil Co., Inc. 1 Neuhaus, Lavaca County, projected to go to 10,000 ft.

Southern Drilling & Well Service Co., Houston, Tex., is rigging up for 1 Kellner, to be drilled for Pan American Production Co. in the Boling field, Wharton County, Texas. Contract depth is 5,700 ft. Southern is completing 1 Mullins for Danciger Oil & Refineries, Inc., in the same field, and has tools running at 1 J. H. Pridgeon in that field for Charles A. Elliott et al.

Oil Production Maintenance, Inc., Houston, Tex., has contracts for two workover jobs. One is for Texas Co. at C-23 Pierce estate, in the Withers field, Wharton County, Texas. The other is a subcontract on a well in the Lovell's Lake field, Jefferson County, Texas, for Rowan Drilling Co.

Tire-Inspection Period Lengthened 6 Weeks

Joseph B. Eastman, director of the Office of Defense Transportation, has postponed the final date for initial commercial motor vehicle tire inspections, as required by General Order ODT 21, from January 15 to February 28, 1943.

After the initial inspection is made, the vehicle must then be presented for regular inspections every 60 days or every 5,000 miles, whichever comes first. All inspections must be made by inspectors designated for this service by the Office of Price Administration.

"Commercial vehicle owners should have their tires inspected at the earliest possible moment," Mr. Eastman said. "An early inspection will not only save the owner from any last-minute delay and inconvenience, but may also reveal casing breaks, or other tire weaknesses which, if undetected, would result in premature tire failure."

If the tire inspector finds the vehicle's tires in good condition he endorses the Certificate of War Necessity. Certificates which do not have this valid endorsement cannot be used to obtain gasoline ration coupons from local War Price and Rationing boards.

Moreover, General Order 21 provides that no commercial motor vehicle may be operated following a tire inspection unless the inspector has certified that all reasonable and possible adjustments, repairs or replacements necessary to assure maximum conservation of the vehicle's tires have been made.

In announcing the amendment to Order 21, Mr. Eastman noted that "there are more than 55,000 tire inspection stations now established, but even this large number will not assure commercial vehicle owners of prompt attention if they wait until February 26 or 27."

"Late comers will very probably have to subject themselves to onerous and unnecessary 'queueing up' with resultant inconvenience and loss of time," he warned.

Mr. Eastman also urged those commercial vehicle owners whose mileage and fuel allotments require adjustment to get in touch immediately with their local ODT field representative. A large number of temporary transport rations have been issued but only a small number of operators have applied for adjustment of their Certificates of War Necessity thus far, the ODT said.

Operators who put off too long applying for necessary adjustment of their Certificates of War Necessity allotments may have difficulty in obtaining fuel for their vehicles later on, the ODT warned.

Hawthorn Made Chief of PAW Equipment Section

Appointment of David G. Hawthorn as chief of the Production Division's Materials and Equipment Section, was announced last week by the Petroleum Administration.

Mr. Hawthorn will handle the equipment requirements and allocation for the production branch of the oil industry as affected by the Controlled Materials Plan.

Mr. Hawthorn is on leave of absence from the production department of the Amerada Petroleum Corp., Tulsa. Born in Cohoes, N. Y., he moved to Denver, Colo., during his childhood and attended grammar and high schools in that city. In 1924 he was granted a bachelor of science degree in mechanical engineering from the University of Colorado, and four years later was awarded a professional degree of "Mechanical Engineer."

From 1924 to 1929, Mr. Hawthorn was on the production and engineering staff of the Marland Oil Co. of Oklahoma, with headquarters at Ponca City. In 1929 he transferred to the production engineering department of the Barnsdall Oil Co. of Tulsa, where he remained 5 years. In 1934 he joined the Amerada corporation, where he remained until July 1942, when he was granted leave to go to the Naval Ordnance Laboratory.

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PERSONALS

Dr. Richard J. Gonzales, economist for Humble Oil & Refining Co., Houston, Tex., is the author of an article predicting a postwar standard of living that will far surpass anything dreamed of before 1942 appearing in the December issue of "The Controller," publication of the Controllers Institute of America. Call on the oil industry to produce 250,000 bbl. of aviation gasoline daily, chiefly 100-octane fuel, is cited by Dr. Gonzales as one of the outstanding war contributions of petroleum.

Paul Truesdell, director of publicity for Universal Oil Products Co., Chicago, has become a grandfather. An 8½-lb. son was born to Mrs. Miles W. Truesdell, wife of his youngest son, in West Suburban Hospital, Oak Park, Ill., on January 12.

Donald R. Feagin, a lieutenant in the Naval Reserve, who has long been associated with his brother, **Barney Feagin, Jr.,** and the Bar-Don Oil Co., Tulsa, reported for duty at the naval training base at Tuscon, Ariz., January 15.

Barton P. Sibole, president of the Stanolind Pipe Line Co., was last week designated "Man of the Year" by the Tulsa Chamber of Commerce Green T. Club. His selection for the honor was based on "distinguished personal service, leadership and achievements in the advancement of the social and civic welfare of Tulsa in 1942."

Jules J. Guichet, chemical-products division in Standard Oil Co. of Louisiana's plant at Baton Rouge, La., last month received the highest award ever disbursed by Standard Oil Co. (New Jersey) affiliates for an operating suggestion. He was awarded $1,000 for suggesting the installation of two "quench points" instead of one in the gas-stream circuit. By alternating the quench points, expansion of the transfer line is changed and this loosens the coke deposit at that area and allows the gas stream to carry the freed coke through the line, into the bubble tower and then into the tar bottoms.

Earl M. Stilley, consulting geologist, was elected president for 1943 of the North Texas Geological Society, Wichita Falls, Tex. **Clinton Engstrand,** Shell Oil Co., Inc., was elected vice president and **Dan Heninger,** Ohio Oil Co., became secretary-treasurer.

C. W. Eckman, who has been affiliated with the H. K. Stahl Co. of St. Paul, Minn., for the past 14 years as vice president and general manager, became assistant general manager of the Northwestern Refining Co. at St. Paul Park, Minn., January 1. The Northwestern Refining Co. operates a 3,500-bbl. plant and barge terminal. **Arthur T. Erickson** is president and **Elmer R. Erickson** is treasurer and general manager.

A. M. Jones, production superintendent in the Kansas area for Nadel & Gussman, has been transferred from Winfield, Kan., to McPherson, replacing **W. G. St. Clair,** Wichita.

Lee A. Ebauch, a driller for Shell Oil Co., Inc., in the San Joaquin Valley of California for several years, has been appointed drilling foreman of the San Joaquin division and will maintain headquarters at Bakersfield.

Lt. B. H. Hessman, who was a geophysical seismograph helper for Shell Oil Co., Inc., before he entered the Army Air Force, has been assigned to a communication squadron at Sheppard Field, Texas.

R. W. Erwin, engineer for Salt Water Control, Inc., Tyler, Tex., is one of the busiest technicians in the East Texas field. Recently he was elected chairman of the East Texas section, American Institute of Mining and Metallurgical Engineers and currently is devoting much time to association work as well as in the expanded duties resulting from more active attack on the salt-water-disposal problem.

EDWARD C. BORREGO

Venezuelan Fields Stepping Stones In His Path

EDWARD C. BORREGO, a Coloradoan, is rapidly adding intimate knowledge of Venezuelan fields and producing conditions to his previously extensive experience in North American petroleum operations.

Since being transferred to Standard Oil Co. of Venezuela after the Illinois drilling boom subsided, he has served as district superintendent in three Venezuelan fields. For the past 2 years Mr. Borrego has been superintendent in the Jusepin district, eastern Venezuela, one of the most active development operations undertaken in recent years by the Standard of Venezuela. Previously, he was district superintendent at Pedernales, producing field on the Orinoco delta and later at Quiriquire, the first commercial operation in eastern Venezuela and still a major factor in production from that part of the country.

He received his engineering education at the Colorado School of Mines at Golden, Colo., and had his first experience in the petroleum industry in 1926 when he went to Mexico as production subforeman for Huasteca Petroleum Co., a subsidiary of Standard Oil Co. (New Jersey). Four years later he was made district production superintendent for northern fields in Mexico and, in 1934, was promoted to the position of general field superintendent in charge of production in all Mexican fields.

Mr. Borrego was transferred to Tampico in 1937 and became assistant production manager, a position he retained until expropriation in 1938 when he was returned to this country

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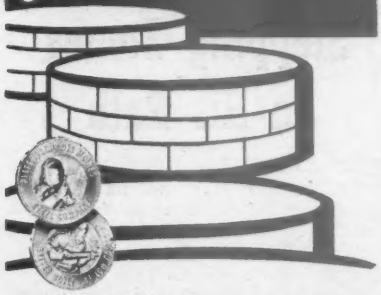

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and assigned to service with Carter Oil Co., Tulsa, Mid-Continent producing subsidiary of the Jersey company.

Recently he renewed acquaintances among Mid-Continent and Illinois basin oil men while in this country on leave from his South American duties.

Dr. Charles E. Morrell has been appointed assistant director of the chemical division of Standard Oil Co. of New Jersey laboratories, Bayway, N. J. Dr. Morrell, a graduate of the University of Kentucky, where he received his bachelor and master degrees in industrial chemistry, won his doctor's degree in physical chemistry at the University of Minnesota. He joined the Jersey research organization as a chemist August 1, 1935. He was transferred to the chemical division January 1, 1937, serving successively as senior chemist, Group Head B and Group Head A.

Frank C. Roper, consulting geologist of Houston, Tex., is now a first lieutenant in the Army Air Force, stationed at Brooks Field, Texas.

Alex Purviance, Goose Creek, Tex., who made a hobby of weather studies during his service with pipe-line construction companies and oil-field material contractors, has converted that interest into almost a full-time job since his retirement, and he is known as Goose Creek's weather observer. Instead of the small barometer, common drug-store thermometer, and an inexpensive blank book for keeping records, which used to constitute his equipment, he now has precision instruments, an official rain gage, government-approved heat and humidity indicators, a modern barometer and big ledgers for his records. Mr. Purviance is secretary of the Goose Creek Rotary Club.

Charles Day, Richfield Oil Corp.; **T. G. A. Cook,** Texas Co.; **H. J. Maxwell,** Standard Oil Co. of California; **C. D. Gard,** Union Oil Co.; **J. B. Taylor,** Signal Oil & Gas Co.; **F. D. Parker,** Bechtel-McCone-Parsons Corp., and **F. S. Magruder,** discussion leader, composed the panel of experts answering questions of the membership at the January meeting of the California Natural Gasoline Association.

Comdr. W. H. Osgood, formerly director in charge and director of production for PAW, District 5, has resumed active service with the U. S. Navy as inspector of naval oil reserves in California and in his new capacity will be in direct charge of Elk Hills operations, including the properties recently acquired from Standard Oil Co. of California. **C. B. Garrettson,** director of marketing, is now also the acting director in charge of the district succeeding Commander Osgood. **E. L. Davis** has become acting director of production for District 5.

Louis F. Rothermel, president of Maritime Oil Co., which has a refinery at Galena Park, Tex., last week was elected a director of the Houston National Bank.

Ben H. Parker, a geologist in the Rocky Mountain area, has been put in charge of a new land and geological department created by the Frontier Refining Co., of Cheyenne, Wyo., with the objective of seeking its own production. Offices have been opened in the First National Bank Building, Denver, Colo., and he will be assisted by **Robert McMillan.**

R. A. Weingartner, senior geologist for Stanolind Oil & Gas Co., Houston, Tex., last week was elected a vestryman of St. James Episcopal Church in that city.

E. P. Doremus, chemist for Shell Oil Co. at its Deer Park, Tex., refinery, has been engaged by the University of Houston as instructor in petroleum chemistry. The course includes study of butadiene and foreman training.

EDDIE EILAND

Eddie Eiland, for 16 years in the production department of Gulf Oil Corp., Houston, Tex., is on an island somewhere in the Pacific, serving with the Seabees. He writes to his former boss, **Carl Russ,** production superintendent, that Seabees—short for U. S. Naval Construction Battalion—build bases for troops, or rebuild them if they have been smashed by bombardment. Mr. Eiland resigned his position last May and enlisted for war service.

Shifts: Coxey Evans, superintendent, Cities Service Oil Co., Seminole, Okla., to Albion, Ill.; **George S. Bancroft,** engineer, Oklahoma Pipe Line Co., Wewoka to Wilson, Okla.; **D. T. Luttes,** engineer, Oklahoma Pipe Line Co., Tulsa to Wewoka, Okla.; **H. D. Murray,** engineer, Texas Co., Sundown to San Antonio, Tex.; **R. W. Hirsch,** engineer, Shell Oil Co., Inc., Tulsa to Perry, Okla.; **C. G. Adams,** geologist, Texas Co., Douglas, Wyo., to Chickasha, Okla.; **E. A. Landreth,** president, Landreth Co., Fort Worth, Tex., to Wauwatosa, Wis.; **E. L. McIntyre,** superintendent, Pure Oil Co., Pauls Valley to Madill, Okla.

David A. Bartlett, president of Keener Oil & Gas Co., entered the Naval Academy, Annapolis, Md., on January 8 to train for a commission under the Navy's V-7 program. Mr. Bartlett, who graduated from New York University and lived at Marietta, Ohio, took over active management of Keener and associated companies in Tulsa 3 years ago. He was previously associated with Phillips Petroleum Co.

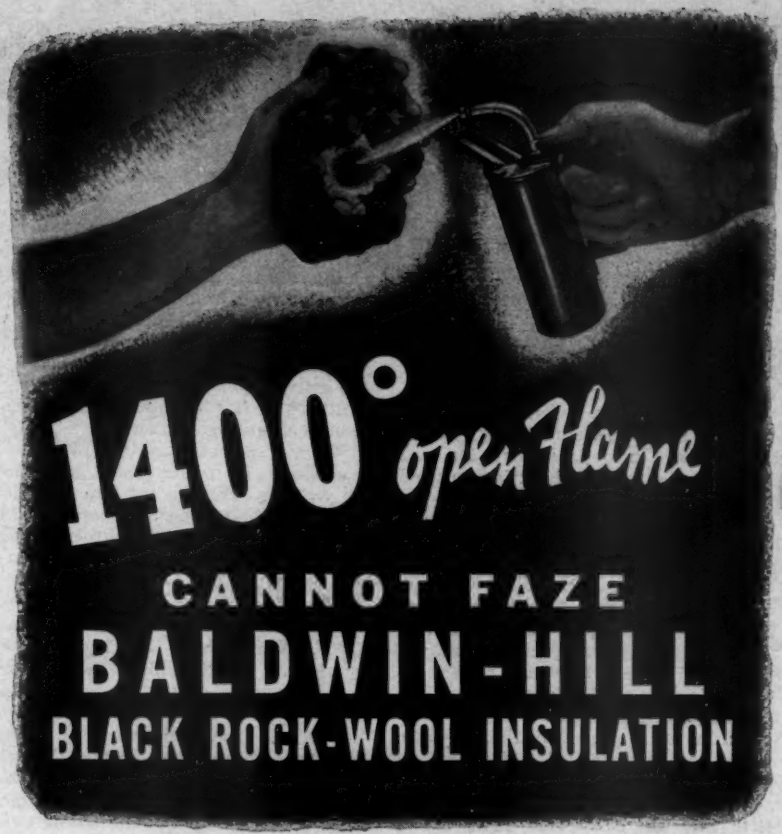
Dr. Charles D. Lowry, Jr., of Universal Oil Products Co., will discuss "Recent Developments in the Technology of Petroleum Refining," before the Maryland section of the American Chemical Society, at Baltimore, January 22.

Paul L. Lyons, chief scout of the Stanolind companies, has been elected general chairman of the Nomenclature Committee of the Kansas-Oklahoma Division of Mid-Continent Oil and Gas Association, succeeding **Paul G. Potter**, chief scout of Shell Oil Co., Inc.

Dr. Norman D. Newell, assistant professor of geology at the University of Wisconsin, has arrived in Peru where he will head a party exploring interior regions of the country for structural conditions favorable to accumulation of oil. He was engaged by the Peruvian Government to investigate conditions on the eastern side of the Andes with the thought that foreign companies operating in that country could be induced to expand exploratory operations if favorable locations are proven available.

Clarence H. Jay, assistant secretary-treasurer of Pure Oil Co., Chicago, Ill., January 20 received an eight-star employes service pin celebrating completion of 40 years of uninterrupted work with the company or its predecessors.

Mr. Jay joined the Columbus Gas & Fuel Co. in Columbus, Ohio, January 20, 1903, as a bookkeeper. He was later assigned to securing oil and gas leases for the company, and he was especially active in the Cabin Creek, West Virginia area, where Pure brought in its first crude-oil production and a field which is still operating. In 1914, he was appointed auditor of the company; in 1920, he succeeded to the post of comptroller and in 1929, he was appointed to his present position at general headquarters.



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Market Developments

East Coast

NEW YORK.—Oil suppliers in the East Coast area continued to struggle with problems arising from the shortage of petroleum products, delay in the issuance of federal directives regarded as essential to clear up confusion, and conflicting reports with respect to the transportation outlook. The supply outlook is confused by an ODT prediction of tank-car shipments in excess of 900,000 bbl. daily into the district in the near future, against the PIWC report estimating the movement at 714,000 bbl. daily for January, 780,000 bbl. for February and 875,000 bbl. for March.

The most favorable aspect of the present situation, the trade reports, is the indication that federal oil agencies are beginning to crack down on non-essential oil usages in the Atlantic Coast, as evidenced by the ban on pleasure driving of automobiles.

Prices along the East Coast continue firm and there appears little possibility of an early change in view of declining inventories. The trade believes price increases are required to offset increasing operating costs caused by refinery yield adjustments and rising distribution charges.

The trade anticipates that an oil directive soon will be issued or an amendment attached to present Directive 59 and PAW Order 1, combining the pooling plan and the quota and priority systems, placing federal oil agencies in even closer touch with inventories and distribution.

Mid-Continent

WEATHER this week intensified the call for fuel oils of all grades. Prices were firm at, or very near, ceiling levels, sellers rejected all sorts of attractive offers from new customers, short of premium prices and most refiners attempted to augment their current production by purchases in the open market. Attempts to buy from other refiners were mostly unavailing because all suppliers were in approximately the same circumstances so far as stocks and demand are concerned.

Difficulties in maintaining normal distribution systems under present weather conditions magnified the call for new supplies. Stocks in certain areas were literally frozen because of inability of jobbers to cover their normal routes.

Meanwhile, refiners watched anxiously for the promised compensation from Washington for the more drastic changes in yields dictated by the Petroleum Administration for War. Assurances have been extended that refiners will receive some sort of adjustment in product prices to offset the instructions to produce larger percentages of fuel oil at the sacrifice of more valuable gasoline.

If OPA reduces gasoline prices too drastically, or to the extent indicated by eastern refinery operations, Mid-Continent plant operators are fearful the fuel-oil ceilings will not be raised enough to arrive at a balance.

Gulf Coast

HOUSTON, Tex.—Scarcity of U. S. Motor gasoline for blending purposes was a subject of somewhat uneasy comment in the refined-oil trade this week. Naphtha too had almost disappeared from the market. Efforts to obtain U. S. Motor gasoline are said to have disclosed almost total absence of supplies throughout the whole Gulf Coast area. Other grades were firm, with no acute excesses in any quarter. Insistence of the Government that refiners cut their runs to stills 31 per cent, at the same time asking them to make more fuel and burner oil and less gasoline, has posed operating problems which many plants find hard to meet.

Fuel oils and kerosene continue extremely tight. Practically all these products are going to the East Coast, where buyers are clamoring for more. Refiners who try to fill orders for kerosene by getting material from other refiners are wholly unsuccessful. Natural gasoline, for which Army, Navy and Air Force requirements have created a rising market, was reported hard to get during the week and shopping around was necessary to fill current needs.

Refiners and marketers say they see no signs of relief in transportation conditions. Shippers of single tank cars report there has been no improvement since the ODT undertook to shorten the time of returning empty cars from eastern destinations. Some say the situation is slightly worse than it was. Shippers in trainload lots may fare a bit better than single-car shippers, but comments in the trade afford little support for the assumption.

Pacific Coast

LOS ANGELES, Calif.—California markets were stagnant during the current week reflecting the shuffle resulting from suspension of operation by the Douglas Oil & Refining Co. plant. There has been pronounced restriction in markets due to inability of suppliers to move gasoline, coupled with the volume losses, resulting from the closing of more retail outlets.

Fuel-oil demand, following several years in which it was a drug on the market, continues at a brisk rate. Gas oil is practically unobtainable as every barrel offered is quickly snapped up. With prices pegged at the current ceilings there is little incentive for refiners to increase activities. Lack of special incentives for manufacturers during the past 2 years resulted in closure of several West Coast refineries. Several of those still active have converted facilities to production of aviation gasoline. When Southern California Gas Co.'s synthetic rubber plant goes into operation the supply of lower grades of gasoline will probably be used as a charging stock.

Some marketers have been attempting to maintain accounts by selling gasoline in limited quantities in order to maintain established brands but this policy may become untenable if sales continue to decline. Most independents have pulled out of the market temporarily and have shut down their respective refineries. Hancock Oil Co. shut down for several months last year but is again running another's crude oil on a barrelage charge. This company will probably begin making aviation gasoline in the near future, provided the necessary equipment can be obtained.

A.P.I. REFINERY REPORT

Week Ended January 9, 1943

(Figures in thousands of barrels.)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	154	2,764	497	700
Ind., Ill., Ky.	735	16,668	2,426	5,464
Okla., Kan., Mo.	332	6,876	1,415	1,667
Censored area*	1,634	37,089	12,027	20,813
Rockies	98	1,658	572	372
California	721	19,190	55,622	12,351
Total 1- 9-43	3,674	84,245	72,559	41,367
Total 1- 2-43	3,734	82,420	72,881	42,913
Total 1-10-42	3,885	97,010	93,651	47,906

Note: Refinery runs and stocks for week ended January 16, 1943, appear on Trends page.

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
January 9, 1943	232,191,000
January 2, 1943	233,938,000
January 10, 1942	244,364,000

*Excludes heavy, unrefinable stocks in California.

Refinery Prices

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

(Prices as of January 17)

Refinery Gasoline

Octane (A.S.T.M.):	†80	74-76	72-74	68-70	63-66
Mid-Continent*	.....	.....	5.875-6.000	.....	5.500-5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast‡	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	.....	6.250-6.500	6.125-6.250	5.750-6.000	5.125-5.250

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

Natural Gasoline

Grades:	26-70	18-55
Oklahoma (Group 3)	3.875	4.650
North Texas	3.500	4.200
North Louisiana	3.625	4.350
California	4.875	5.500

Kerosene and No. 1 Fuel Oil

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	3.875	.....

*Basis Oklahoma Group 3.

Tractor, Diesel, and Bunker Fuel Oil

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Bunker C
Mid-Continent*	4.125	.....	.....	.....	.....	.....
California	.....	2.750-4.000	.....	.....	‡$1.35-1.45	$0.85-0.90
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85
Northeast Coast	.....	.....	.....	6.800	2.780	1.65
North Louisiana	.....	.....	.....	.....	.....	†0.80-0.85

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200.

Furnace Oil, Gas Oil, Fuel Oil

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
Pacific Coast	5.5	5.5	‡0.80-95	§0.80
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel oil. ‡Pacific Specification 300. §Pacific Specification 400.

Lubricating Oils

Bright and Steam Refined

OKLAHOMA (Group 3)—

200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)	9.00	9.50

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Neutral Oils

CALIFORNIA—

Pale oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00

Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25

GULF COAST—

Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:	
Zero pour point	37.50
10 pour point	36.50
15 pour point	35.50
25 pour point	30.00
200 vis. at 70° F., 3 color:	
Zero pour point	39.50
10 pour point	38.50
15 pour point	37.50
25 pour point	32.00

Wax

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.50	10.20
Boston, Mass.	14.90	4.50	9.80
Burlington, Vt.	16.90	5.50	10.10
Buffalo, N. Y.	16.20	5.50	10.60
Dover, Del.	16.70	5.50	12.00
Hartford, Conn.	15.60	4.50	9.70
Manchester, N. H.	17.30	5.50	10.80
Newark, N. J.	15.20	4.50	9.70
New York, N. Y.	16.10	5.50	9.80
Philadelphia, Pa.	16.20	5.50	11.65
Pittsburgh, Pa.	16.70	5.50	12.00
Portland, Me.	16.30	5.50	9.90
Providence, R. I.	15.00	4.50	9.60
Washington, D. C.	15.20	4.50	11.00
Average 14 cities	16.02	5.14	10.49

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co., and Texas Co.)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich.	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind.	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	....
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla.	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	‡9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	16.90	8.50	10.50
New Orleans, La.	17.75	8.50	*10.00
Norfolk, Va.	17.45	6.50	12.00
Average 11 cities	18.25	7.50	10.46

*Includes 1-cent state tax.
‡Includes ½-cent state tax.

MIDWESTERN

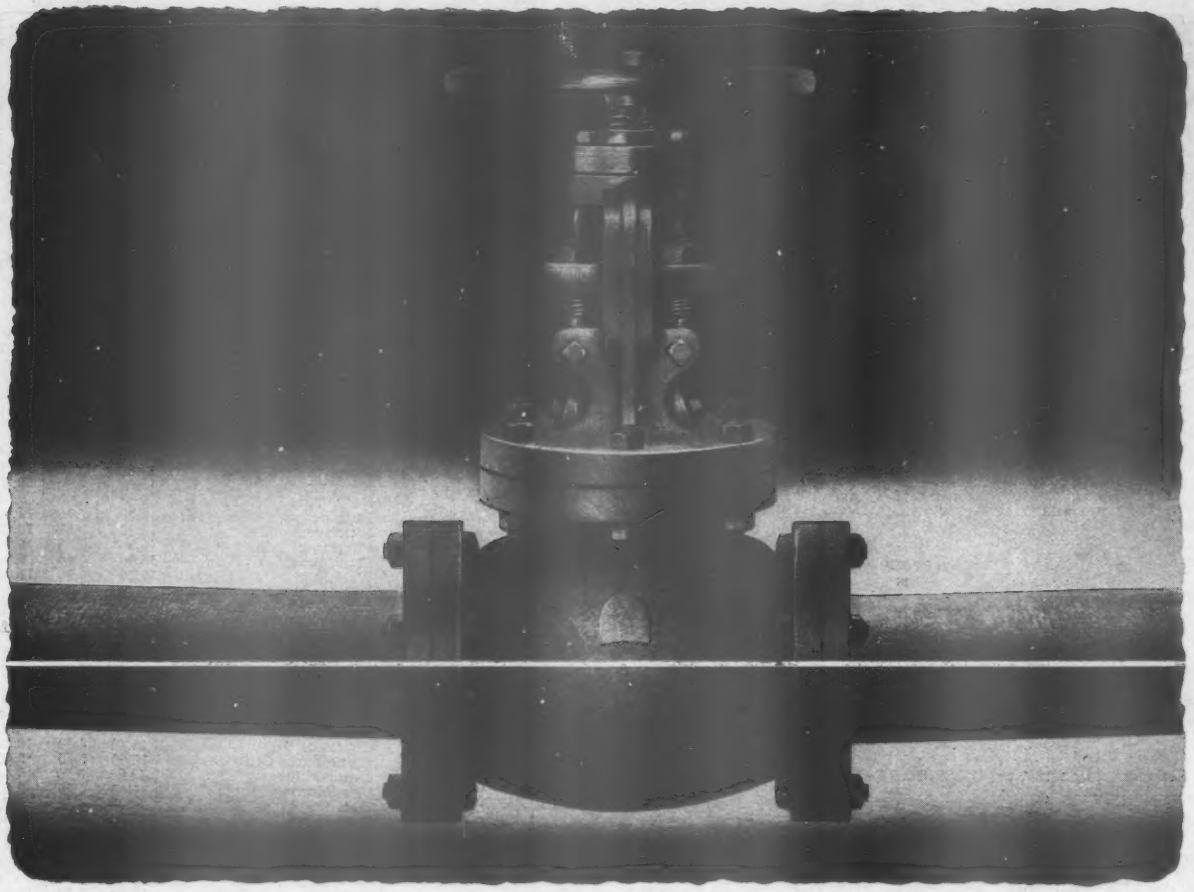
(Continental Oil Co.)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Albuquerque, N. M.	17.50	7.50	10.50
Boise, Idaho	20.10	6.50	13.30
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.30
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.63
Average 50 cities	16.57	5.96	10.76



GUARD YOUR VALVES GIVE THEM PROPER SUPPORT!

PROVIDE EXPANSION BENDS OR JOINTS

Don't so install valves that they carry the weight, sag or expansion of the line. Valves are not designed to carry that type of load. Distortion will result in inefficient operation, jamming, and need for early maintenance. Maintenance materials, you must remember, also are on the critical list.

It might be a good idea to approach inspection of every valve with one thought, *"What's wrong with this?"* Guard your valves. They will last longer.

Don't Use Gate Valves or Cocks for Throttling . . .

Gate Valves and Cocks should be opened wide and closed tight. When operated otherwise they are soon ruined, giving unsatisfactory service in the meantime. Use Globe and Angle Valves for throttling.

Write to Reading, Pa., general office, for copy of "VALVE DON'TS" —a poster for plant use that tells things NOT to do to valves.

READING-PRATT & CADY

MANUFACTURERS OF
READING CAST STEEL VALVES AND FITTINGS
PRATT & CADY BRASS AND IRON VALVES
D'ESTE VALVE AND ENGINEERING SPECIALTIES

Reading, Pa., Atlanta, Boston, Chicago, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco

A DIVISION OF AMERICAN CHAIN & CABLE COMPANY, Inc., BRIDGEPORT, CONNECTICUT

Equipment Progress

Unitized Block Assemblies Feature Compactness

Two unitized block assemblies recently developed by Baash-Ross Tool Co., Los Angeles, Calif., combine both the block and hook into one compact, streamlined unit, thus saving space over the separate block-plus-hook arrangement generally used. By decreasing the space required for hook and block, they substantially increase the effective working height of portable rigs. They permit pipe to be brought out of the hole faster, without risk of running into the crown; they speed up floor operations by the increased working room they provide, and they increase the safety and convenience of portable-rig operations. They are available in two types—either with spring-loaded hook or with spring-loaded adapter—to meet a wide range of portable well-pulling and slim-hole drilling requirements.

(Right) BAASH-ROSS UNITIZED BLOCK WITH LINK ADAPTER ASSEMBLY

(Above) BAASH-ROSS UNITIZED BLOCK WITH HOOK ASSEMBLY

(Inset at right shows Hook open with view of Automatic Latch)

Each of the two types of unitized block assemblies is available in nine sizes—a range wide enough to meet the requirements of practically any portable-rig job. Each type of block is available in one, two, or three-sheave models (capacities 30, 60, and 100 tons, respectively) and each of these models is available with 20-in., 24-in., or 30-in. sheaves.

New Air-Driven Mixers

Mixing Equipment Co., Rochester, N. Y., announces the addition to its regular line of three new heavy-duty air-driven mixers. Two of them are gear-reduction models. The third is a larger direct-drive model.

The important features of these mixers especially adapt them to the mixing of paints, chemicals, high explosives, and alcoholic compounds. The air-driven motors used in these mixers cannot be overloaded or burned out. Even when used in the heaviest liquids they will not stall. The air exhaust from the motor is so arranged that it keeps the motor running cool at all times.

Models of 1 hp. and ½ hp. are available. They are equipped with gear-reduction drive and adjustable shaft length.

McGowan Pump Division Adds to Line

The McGowan Pump Division of Leyman Manufacturing Corp., Cincinnati, Ohio, has recently added to its line a modern design of close-clearance side-pot refinery pumps for the handling of highly volatile liquids. The company is currently producing these pumps for the high-octane aviation-gasoline and synthetic-rubber program. In addition to its regular line of valve plate, outside end packed, forged steel and miscellaneous designs, it is producing these close-clearance pumps in 6, 12, and 18-in. stroke sizes with, of course, steam cylinder and liquid end bores to suit the service conditions.

In the petroleum-transportation field it is producing high-pressure duplex power-driven reciprocating pumps with herringbone gears and roller bearings, as well as vertical reciprocating and centrifugal pumps for the marine service.

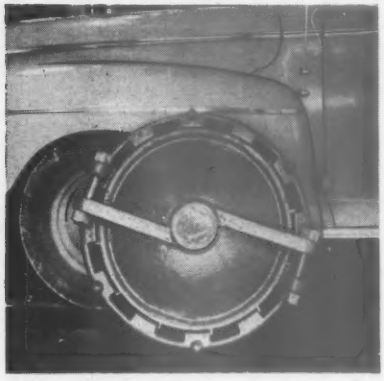
McGowan's design of close-clearance pumps is suitable for 400 lb. suction pressure and 600 lb. discharge pressure in cast iron. The steam cylinders are designed for 250 lb. pressure. The valve areas of the pumps are quite large, resulting in low pressure drops through the pumps. Each of these models can be made with a water-jacketed stuffing box. These pumps have extremely heavy bolting and the bushed stuffing boxes are deep enough to meet modern packing specifications.

ARMY-NAVY "E" AWARD TO MACWHYTE CO.

The Macwhyte Co., Kenosha, Wis., was recently awarded the Army-Navy "E," for outstanding war production in impressive ceremonies at the high school auditorium in Kenosha. Presentation was made by Lt. Col. Edward H. Bowman, representing the Army, while Jessel S. Whyte, president of the company, and Clarence J. Pinzger, president of the Macwhyte Club, received the pennant. Lt. Comdr. Roger Q. White, of the Navy, presented lapel pins to the workers. Receiving the pins in the token presentation were Helen Szytkowski for the women workers,

Lt. Col. Edward H. Bowman presents the flag to Jessel S. White and Clarence J. Pinzger

Samuel Hawkes for the men, and George S. Whyte, founder and chairman of the board, on behalf of the company.



One of a large number of Unibolt scraper trap connections, manufactured by Thornhill-Craver Co., Houston, Tex., to be installed on the War Emergency "big inch" pipe line. The automobile tire in the background provides a graphic demonstration of the size of this huge 24-in. connection

Trade Literature

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.—A 12-page booklet which compares the advantages of a.c. and d.c. welding. A complete line of Flexarc a.c. welders, with current ratings from 100 to 500 amp., is described and illustrated in the booklet. The booklet is numbered B-3136.

American Locomotive Co., Alco Products Division, 30 Church Street, New York City.—Bulletin 1032, on Alco clamp ring joints. This 8-page bulletin describes details and usage of the clamp ring joints, and is adequately illustrated.

Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia, Pa. — An entirely new 29-page catalog, "Micromax Electric Control," which describes control equipment capable of handling any process which can be controlled by positioning a valve or other regulating device. Diagrams and text explain in detail how the equipment is adjusted to fit the needs of a particular process. Catalog is No. N-00A.

General Asbestos & Rubber Division Awarded Burgee

The Army - Navy "E" burgee, awarded for excellence of production, has been awarded to the General Asbestos & Rubber division of Raybestos-Manhattan, Inc., North Charleston, S. C. This was the first "E" swallow-tail to be awarded to the asbestos textile industry. Rear Admiral Cluverius presented the award to Executive Vice President Rohrbach, representing the workers. Hon. L. Mendel Rivers, representative from South Carolina, acted as master of ceremonies. Colonel Barnwell of the Army presented "E" pins to the employes, represented by Dan Legare, a 39-year veteran.

Pvt. Sergei Arutunoff, 23-year-old junior executive of Reda Pump Co., Bartlesville, Okla., is a motorcycle enthusiast and had no difficulty in making shop talk with Pvt. Ray Teska, Fort Sill military police motorcyclist. Private Arutunoff, whose father, Armais Arutunoff, is Reda's president, was inducted last week at Fort Sill

Among Equipment Men

R-S Products Corp. Elects Hopkins Vice President

David W. Hopkins, secretary and director of the R-S Products Corp., Wayne Junction, Philadelphia, Pa., for a number of years, has been elected vice president of that corporation. This announcement followed a recent meeting of the board of directors. He will continue in charge of the company's valve division. Mr. Hopkins was graduated from University of Pennsylvania as a mechanical engineer and later took postgraduate work in aeronautical engineering at Massachusetts Institute of Technology. He was a Navy flier in the last war.

Herrington Paid Tribute

Arthur W. Herrington, chairman of the board of Marmon-Herrington Co., Indianapolis, Ind., is featured in the Portofolio of Personalities, entitled Automotive Merlins, in the January issue of Coronet Magazine.

Accompanying the personality sketch and drawing of Mr. Herrington are six other short biographies of "master mechanics and builders" who are members of the Automotive Council for War Production. Coronet calls them "the unsung heroes of the Aresnal of Democracy — the 'little men' who've whittled giant jobs down to digestible size."

Crane Awarded Army-Navy "E"

J. H. COLLIER

Another concern to receive the Army - Navy "E" is the Crane Co., Chicago, Ill. The company is being cited for high achievements in meeting vast wartime demands for its regular products, which are valves, fittings, and piping accessories. All employes will be invited to the "E" presentation later this month. Representative workers will be elected to receive the award. Acceptance will be made by J. H. Collier, president of Crane Co.

McKimmey Purchasing Agent for Texasteel

V. H. McKimmey has been appointed purchasing agent for the Texasteel Manufacturing Co., at Fort Worth, Tex. He is well known in supply circles, having been with Lucy Manufacturing Co. in Tulsa and National Supply Co. in Fort Worth for a number of years.

Romann Heads Special Committee

John H. Romann, chief metallurgist of Tube Turns, Louisville, Ky., manufacturers of welding fittings and special forgings, was recently honored by being appointed chairman of a committee to conduct a special nation-wide investigation in industrial plants concerning the low-temperature properties of metals.

This research is being carried on for the War Department by the War Metallurgy Committee of the National Research Council, National Academy of Sciences, Washington, D. C.

Mr. Romann has been granted an indefinite leave of absence from Tube Turns in order to direct this work.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED RATE	DISPLAYED—PER INCH
8 CENTS A WORD, minimum charge $2 per insertion.	Classified display advertising set in single or double column style:
SITUATIONS WANTED. 4 cents a word, minimum charge $1.	1 inch..... 1 time $7.00
BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.	1 inch.....13 times.....6.50
10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.	1 inch.....26 times.....6.00
All classified advertising payable in advance.	1 inch.....39 times.....5.50
	1 inch.....52 times.....5.00
	Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE MONDAY NOON—PUBLISHED EACH THURSDAY

LEASES AND DRILLING BLOCKS

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma,
Louisiana and Illinois.
20 Years' Experience
Inquiries Invited
B. D. BUCKLEY
60 Broadview Drive, Clayton
St. Louis, Mo.

NEW MEXICO
State Oil and Gas Leases
Forty acres and multiples thereof, in a new HoT spot. 23 oil companies own surrounding leases. Write for information. No obligation. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, N. M.

CRANE COUNTY, TEX., land nearby Gulf's drilling Sec. 2, B-28. Jefferson G. Smith, 215 Littlefield Bldg., Austin, Texas.

THREE HUNDRED and twenty acres faforably located in Kansas for oil. A. L. Holiday, 209 E. 10th St., Muscatine, Iowa.

ROYALTIES

WE BUY & SELL all types of Oil and Gas Royalties. Sales restricted to registered dealers only. Grimes Royalty Co., National Mutual Bldg., Tulsa, Okla.

INCORPORATION

DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

BUSINESS OPPORTUNITIES

OPERATOR wants financial group to underwrite partial cost of drilling wells to offset production in Oklahoma. Box B-447, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Petroleum by-product manufacturing plant. Located east Texas. Completely equipped and operating. Opportunity for expansion excellent. Plenty raw material. No labor trouble. Only moderate investment necessary. Sacrificing due to serious illness President and General Manager. A clean-cut, legitimate and unusual opportunity. 3932 Bryn Mawr, Dallas, Texas.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

HELP WANTED

ESTABLISHED Midwest Company reclaiming industrial oils and solvents for War Plants needs man to assist General Manager. Experience and temperament should be such that after a period of training, could take full charge of branch plant. For dependable and capable person we offer attractive profit sharing opportunity. Reply in confidence with full particulars. Our employees know of this add. Box B-448, The Oil and Gas Journal, Tulsa, Okla.

PROCESS ENGINEER and construction engineer and chemical engineer wanted for new Oklahoma refinery being built for aviation gasoline. Must be experienced refinery men. Write fully. State salary desired. Permanent opportunity. Write Box B-451, The Oil and Gas Journal, Tulsa, Okla.

WANTED—Graduate mechanical engineer who has had at least several years' experience in maintaining Diesel engines, also heavy centrifugal pumps. Permanent position not in war production; attractive salary. Please reply in writing stating education, age, draft status, experience, salary expected and references. Box B-445, The Oil and Gas Journal, Tulsa, Okla.

PROCESS ENGINEERS
Graduate Chemical Engineer or Chemist with several years experience in refinery or oil field on design and operation of light end equipment. Permanent position. Men employed in war industries will not be considered. Reply must state experience, education, age, draft status and salary expected. Box B-441, The Oil and Gas Journal, Tulsa, Okla.

NOTICE TO ADVERTISERS

Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:

"Applications from those now employed in war industries will not be considered."

HELP WANTED

WANTED
ASPHALT TECHNOLOGIST
Position requires man with technical degree who has had five years' experience in the manufacture and blending of roofing and paving asphalts. Location, middle West with medium sized oil company. Our employees know of this advertisement. Box B-453, The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

PETROLEUM Executive with record of accomplishment in administration of financial and managerial operations in South, Middle West, and East available for permanent connection any part of country. Rm. 1404-105 W. Madison, Chicago, Illinois.

REFINERY ENGINEER—Age 42, Classification 3A. Experienced, Design, Construction, Operation and Maintenance of modern equipment. Box B-430, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED PRODUCTION MAN Wants interest in producing property; will look after all operations and reports. Age 41, have family, 22 years experience production, drilling, good education, references. Box B-392, The Oil and Gas Journal, Tulsa, Okla.

REFINERY FOUNDATION Design and Plans by Registered Civil Engineer. Contract or fee basis. P.O. Box 209, Pasadena, Cal.

REFINERY Superintendent or Process Foreman, now employed. Desires position with aggressive firm with future opportunities. 13 years' experience in the petroleum refining industry, 4 years' experience in the power industry. Familiar with modern operation, maintenance and construction methods. Box B-452, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED EXECUTIVE. Qualified in Federal Income and State taxation. Experienced in all phases oil industry, refinery costs, operating analysis and coordination. Desire change to eliminate traveling. Salary requirements $9,000.00. Available on about 30-day notice. Box 1953, Dallas, Texas.

EQUIPMENT WANTED

WANTED — Dynamometer. Suitable for use with Chevrolet Test Engine. Reply to Box B-446, The Oil and Gas Journal, Tulsa, Okla.

LARGE MINING company is desirous of purchasing one or two Askania Vertical magnetometers in good condition. Apply A. Brandt, 15 Grenadier Heights, Toronto, Canada.

WANTED: To buy one good used late model vertical (Askania) Magnetometer (temperature compensated system). State price. S. M. Goodner, Nashville, Illinois.

DIESEL ENGINES WANTED
1500 HP in one or more units with or without Generators. Single unit preferred. Give full information. Box B-418, The Oil and Gas Journal, Tulsa, Okla.

WANT TO BUY two or three second hand heavy field storage tanks with roofs from 10,000 to 80,000 bbl. capacity, either welded or riveted. Please state location of tanks and specifications together with price. Box B-450, The Oil and Gas Journal, Tulsa, Okla.

WANTED: 4000 pcs. each of 6" and 8" Dresser or Dayton Couplings. Can also use 6" and 8" colona line pipe thread protectors. JULIUS M. FOGELMAN, Reading, Pa.

WANT TO BUY: PA-100 h.p. International Engines. FOR SALE: 1000-barrel riveted tank, several 500-barrel riveted tanks. Address Box 896, Sapulpa, Oklahoma.

WANTED
Abandoned Pipe Lines, in or out of the ground, Oil Wells, Steel Buildings and Steel Storage Tanks of all sizes.
JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair Co., Illinois.

(Continued on Next Page)

CLASSIFIED ADVERTISING — EQUIPMENT FOR SALE

OFFERING COMPLETE OPERATING REFINERY
LYNCH REFINING COMPANY—KILGORE, TEXAS

We are offering for immediate sale this complete combination topping and cracking unit, gasoline plant, carload Ethyl plant, boilers, storage facilities, thirty-mile pipe line gathering system, located in heart of East Texas Field. Must be handled quickly. Wire, phone or write for details.

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry — Robt. W. Duden

Union Ave. at 21st Street — Tulsa, Oklahoma

---

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.

Terms to suit.

CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St., Cincinnati, Ohio.

FOR SALE—One partial list steam rotary equipment less boilers, rotary table, traveling block, swivel, located near Coyle, Oklahoma, priced right to sell. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE: Compressor Units near Crane, Texas. 2—90 H.P. Clark tandem 2-stage gas engine compressors and 3—Vertical 100 H.P. Model T-137 Clark gas engines, direct connected to Vertical 2-stage Clark compressors. Cities Service Oil Company (Pennsylvania), Houston, Texas.

FOR SALE — Approx. 6500 ft. 6⅝" OD 25.20# drill pipe with Reed Full Hole Shrink Grip Tool Joints, A-1 condition. Inquire T. T. Eason and Company, Enid, Okla.

NEW power driven skid mounted piano wire winch, capacity 12,000 feet .072 line, 5 H.P. Briggs & Stratton Gasoline Engine (without measuring device). $332.00.—Box 5296, Dallas, Texas.

USED Admiralty good condensor tubes. One 15 ton locomotive crane. 25—Standard gauge steel flat cars, 100,000# capacity each. Steel buildings—Water tanks on towers of all sizes. Write, wire or phone for INDUSTRIAL EQUIPMENT. INDUSTRIAL SUPPLY & EQUIPMENT CO., INC., 338 Baronne Street, New Orleans, La.

FOR SALE — A large stock of reconditioned valves and fittings suitable for refinery and pipe line service. Inquire Eason Oil Company, Enid, Okla.

---

1 USED Cooper Bessemer GMA 17" x 20" Power Cylinder with piston & rings, Standard size. Box B-454, The Oil and Gas Journal, Tulsa, Okla.

Second hand Oklahoma City alloyed sucker rods, ¾", ⅞" and 1".
Sucker Rods, Fishing Tools, Tubing Spiders, Tubing Catchers, all sizes.
Structural Steel and Reinforcing Rods.

M. R. TRAVIS
1702 S. Boulder Tulsa, Oklahoma.

DIESEL—GAS—ENGINES

Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—boilers, steam engines, and turbo-generator sets.

Complete information on request.

A. G. SCHOONMAKER COMPANY
48 Church Street, New York, N. Y.

FOR SALE—One complete steam rotary outfit less boilers, located near Coyle, Oklahoma, priced to sell. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE—Two 15x10 Chicago Pneumatic Compressors less motors or power units. In excellent condition, suitable for low pressure service. Inquire Eason Oil Company, Enid, Okla.

FOR SALE—Water pumping unit: 5" triplex Demming pump on steel skids with McCormick-Dearing engine with Texrope drive. Good condition. Write Newby, 2909 First Nat'l. Bldg., Oklahoma City, or phone 2-7277.

Used Engines, and Compressors,

We Rebuild and Guarantee

L. F. SMITH CO.

217 W. Archer, Tulsa, Okla.

HORIZONTAL STEEL TANKS

6—10 Ft. dia. by 30 Ft. Long.
2—10 Ft. dia. by 29 Ft. 6 In. Long.
2—9 Ft. dia. by 30 Ft. Long.
10 Above Tanks in Western Kansas,

3—4,000 Gal., 2—6,500 Gal.
2—10,000 Gal. in Ohio and Pennsylvania.

VERTICAL TANKS

29,000 Bbl. 90'6" x 25'6"
19,600 Bbl. 73' x 25'5"
2—7,500 Bbl. 44' x 26'
5,500 Bbl. 37'6" x 27'6".

Located in the East.

1500 BBL. ATMOSPHERIC DISTILLATION REFINERY

700,000 Gal. Storage Cap., 1500 Bbl. Tube Still, 1500 Bbl. Fractionating Tower, 150 H.P. Boiler, Pumps, Compressors, Condensers, Heat Exchangers, Agitators, Loading Rack, etc.

R. C. STANHOPE, INC.

60 East 42nd St. New York, N. Y.

FOR SALE—One #6 Type D-1618 Marley Tapered Type Cooling Tower; capacity 600 GPM; priced right. Inquire Eason Oil Company, Enid, Okla.

5—7⅛"x20" Type VS, 500-lb. W. P. Clark Compressor Cylinders complete with clearance pockets. Call or write Cimarron Gasoline Corp., Box 246, Coyle, Okla.

COUPLINGS: For Sale — 2000 pcs. 5½" OD, 500 pcs. 7" OD, 100 pcs. 6⅝" OD. All 8 Round Thread, API Casg. New, Perfect, Mill Tested. JULIUS M. FOGELMAN, Reading, Penna.

FOR SALE: Skid mounted tailing in drilling unit. Two Lufkin drums chain driven, over 6000 feet capacity. Spudding arms for cleaning out or drilling. Shelbro Petroleum Co., 334 Court Arcade, Tulsa, Okla.

FOR SALE—Bolted Tanks 5000 and 10,000 barrel capacity API construction, practically new. Feldman Petroleum Company, 844 W. Roosevelt Rd., Chicago.

COUPLINGS

2500—Brand new 13", OD casing couplings, 8-V thread, priced to sell. Louisiana Iron & Supply Company, Longview, Texas.

FOR SALE: O.C.S. Drilling Clutch, type F.C. V-Belt Drive, mounted on steel skids. Wire or write C. V. Phillips, 403 Crescent Blvd., Hutchinson, Kansas.

ONE RL Cardwell Double Drum Spudder. Mechanically A-1 shape. Complete with lines and tools. Address 2501 North Hudson, Oklahoma City, Oklahoma.

FOR SALE: Complete oil jobbing plant, 15 storage tanks about 11,500 gal. each, 4 horizontal. P.O. Box 284, Tulsa, Okla.

1—4" Shell 4' x 40' Forged Steel Reaction Chamber
1—½" Shell 5' x 74'—4000 barrel cap.—Crude Oil Fractionator with Trays.
120—Pieces 3" I. D.—3½" O. D.—30' long—Chrome Tubes.
30—Pieces 3½" I. D.—4" O. D.—21' to 28' long—Chrome Tubes.
162—3½" O. D.—6½" Centers—Chrome Key Headers.
30—Pumps, various sizes and types.

A. C. BARTSCH
BOX 127, FOREST PARK, ILLINOIS

SPECIAL OFFER
IMMEDIATE SHIPMENT

OXYGEN-ACETYLENE WELDING HOSE SETS

Guaranteed—Heavy Duty
Standard Size—Double Braid
Samples furnished on request

Each set consists of OXYGEN hose (BLACK) and ACETYLENE hose (RED) with standard brass couplings attached to fit all makes of torches and gauges.

Length set	Price per set
12½ Ft. set	$ 3.10
25 Ft. set	5.80
50 Ft. set	10.80
75 Ft. set	15.80
100 Ft. set	20.80
Connector set	.30

Hose also furnished in continuous length reels of approximately 250 ft. and 500 ft. lengths.

OXYGEN HOSE	10c per ft.
ACETYLENE HOSE	10c per ft.
STANDARD COUPLINGS	15c each

Prices net—F.O.B. New York

CARLYLE RUBBER CO., Inc.
62 Park Place New York, N. Y.

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE OR TRADE: Complete Cable Tool Drilling Rig with 85 H.P. Boiler, Ajax Steam Engine Complete Tools 6" to 12", also 96' Angle Iron Derrick, Mead, Kansas. John Irby, Box 4387, Oklahoma City, Okla.

FOR SALE: Four Gasoline Storage tanks, 10' x 20' Horizontal Welded steel. Capacity 10,000 gallons. Excellent condition. Located Kaw City, Okla. Two 1500 Bbl. Flat-Seam API Bolted Tanks now in use, Okla. City, John Irby, Box 4387, Oklahoma City, Okla.

FOR SALE: Two 110-HP Miller gas driven twin cylinder compressors. Priced right. Inquire Eason Oil Co., Enid, Okla.

FOR SALE: Portable Lincoln 300 Amp. Electric Welding Unit, Stutz motor, Mounted on good tires, all A-One condition. Price $375.00. General Tool & Supply Co., Box 4387, Oklahoma City, Okla.

FOR SALE: No. 2 National Drilling Machine with gas engine, 6, 8 and 10" tools, good condition. F. G. Crary, R.R. #1, Lexington, Ky.

EQUIPMENT FOR SALE

ONE Steel Building 50 foot by 280 foot. One Steel Building 32 foot by 48 foot. Industrial Supply & Equipment Co., Inc. 338 Baronne Street, New Orleans, La. Raymond 0889.

DIESEL ENGINES

Large selection—all sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—also boilers, steam engines, turbo generators.

Complete information on request.

A. G. SCHOONMAKER COMPANY
50 Church St. New York, N. Y.
Phone—Worth 2-0455-6-7

LEGAL BLANKS

OIL FIELD LEGAL BLANKS

Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

Oklahoma Fields

(Continued from Page 78)

120 bbl., through choke, Wilcox 5,700-10 ft., T.D. 5,743 ft.

Liberty, North, Noble County: Deep Rock 1 Veronneau, NE SW NE 10-22n-3e, dry, T.D. 4,415 ft., Wilcox 4,384 ft.

Oklahoma City, Oklahoma County: C. C. Peppers 1, Blk. 33, NW SW NW 34-12n-3w, pumped 238 bbl., Wilcox 6,456-6,525 ft., T.D.

Pauls Valley, Garvin County: Pure 2 Jackson, NW SW SE 31-4n-1e, flowed 107 bbl. in 4 hr., pay 4,090-4,119 ft.

Rusk, Okfuskee County: Malernee 1 Tyler, NE SW SE 7-11n-8e, flowed 600 bbl., Cromwell 3,645-60 ft.

Velma, Stephens County: Skelly 31 Franklin, NE SW SE 35-1s-5w, dry, T.D. 1,300 ft.

W. F. Turner 1 Spears, SW SE SE 15-1s-5w, dry, T.D. 2,256 ft.

East Watchorn, Pawnee County: Alma Oil 1 Tohee, SW NE NE 35-23n-3e, flowed 260 bbl. in 6 hr., Wilcox 3,924-36 ft., T.D.

Wewoka townsite, Seminole County: Jordan Pet. 1-A Cohee, N½ NW NE 17-8n-8e, flowed 70 bbl., Hunton 3,906-14 ft., T.D. 4,299 ft.

Miscellaneous

Hughes County: S. W. Collins 1 Jenkins, SE NW SW 14-7n-9e, dry, T.D. 1,297 ft.

Payne County: Deep Rock 1 Little, NE NE NE 13-19n-4e, dry, T.D. 3,800 ft., sand 3,325 ft., Misener 3,762 ft.

Jordan Pet. 1 Hudson, NE NW NW 5-19n-5e, dry, T.D. 3,881 ft., Wilcox 3,788 ft.

Seminole County: H. Diamond 1 Scott, SE SE SW 2-6n-5e, dry, T.D. 3,165 ft., Cromwell 3,150 ft.

LEGAL

OIL AND GAS LEASE

UNITED STATES DEPARTMENT OF AGRICULTURE, Forest Service, Jackson, Mississippi, January 16, 1943. Sealed bids in triplicate will be received until 10:00 A.M., Central War Time, February 16, 1943, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on national forest land located in the E½, Section 31, Township 13 North, Range 5 West, Sharkey County, Mississippi, containing 320.56 acres, more or less. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms, and operating regulations from the Forest Supervisor, United States Forest Service, Masonic Building, Jackson, Mississippi.

Canadian Fields

(Continued from Page 76)

secured a large crown reservation in this area a couple of years ago, and in 1941 carried on geological and geophysical surveys as a result of which 15,840 acres were actually leased. Subsequently these holdings were increased by 28,120 acres from various sources. Acreage is mostly on the Lloyd Lake-Gladys Ridge trend, reported on by Dr. G. S. Hume of the Geological Survey and by J. S. Irwin of Calgary. Drilling will probably start early in the spring.

Commonwealth Takes Acreage

A block of some 19,920 acres in Townships 20, 21, and 22, Ranges 1 and 2, extending from the southeast corner of the Sarcee Indian Reserve south to Sheep Creek has been secured by Commonwealth Petroleums of Calgary, which is preparing to carry on preliminary exploration work. The area is considerably east of Turner Valley, and east of the Anglesey-Lakeview and Sentinel wells, which some years ago were carried to considerable depth but failed to get production.

Eastern Alberta

In the Vermilion field, eastern Alberta, Atlas-Sherman 2, LSD 1, 31-50-5w4, finished at 1,808 ft., with the electric log indicating a better than average oil sand. The well will be left standing pending arrangements for marketing Vermilion crude. Location is on the northwest edge of the proven field, and results indicate a further extension in that direction. Pacalta Oils has let contract and secured casing for a new test in the proven area, to spud some time in February.

Advisory Committee Named

Appointment of a committee of Alberta oil men by G. R. Cottrelle, dominion oil controller, to advise him on matters pertaining to oil production in western Canada has been announced. The committee comprises E. H. Hunt (chairman), chief of the geological department of the McColl-Frontenac Oil Co.; J. G. Galloway, vice president of Standard Oil of British Columbia; M. D. Kemp, member of the Petroleum and Natural-Gas Conservation Board of Alberta; J. H. McLeod, production manager of Royalite Oil Co.; and R. A. Brown, Jr., Calgary oil operator.

Nebraska Deep Test Resumed

NORFOLK, Neb. — Drilling operations have been resumed in the deep-test oil well on the Taylor ranch, near Neligh, Neb., with the arrival of additional drill pipe, F. D. Baxter, president of the Baxter Drilling Co., which has the contract, has announced.

The well, he said, will be drilled to granite in an "effort to find an even better producing zone than those already located. Casing will be set in the best zone and production started."

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

Journalisms:

THE OIL AND GAS JOURNAL'S Annual Review of 1942 and Outlook for 1943 will appear next week. In keeping with the new appearance of the Journal, the statistical part of the review will be streamlined, presenting vital information in more convenient form. The field reviews will include last year's production for all fields together with the cumulative production to date. The record of discoveries will include all important finds with maps showing their location.

THIS year, as never before, reserve estimates are of great importance. In the past, the Journal has given more detailed figures than are available in any other published report on reserves. This year, it is presenting even more. Estimated proven and recoverable reserves are given for every field from which production records are available and which is active today. This has necessitated checking all estimates and the information afforded by this check shows a rather disturbing condition. For the past few years, discoveries and major extensions have not been sufficient to offset actual production. Because of the steady increase in demand for crude, new reserves should total about 50 per cent more than actual production if the nation is to maintain a favorable position with respect to future requirements. The deficiencies of the past few years have been stressed repeatedly and the prediction has been made that the record of 1942 will show no improvement.

ACTUALLY, the discoveries of 1942 have fallen far short of the record of even the preceding 3 years. In all 3 years, revisions of previous estimates have added enough reserves to the older fields to make up the difference between production and discoveries. This year's revision shows no such increase. Actually, increasing production in many fields has resulted in a decline in estimated reserves. Development of many recent discoveries has uncovered conditions which makes estimates of proven reserves in these new fields too great. The decline in drilling in 1942 has had a very serious effect on the nation's known potentialities and the review of the oil situation at the end of 1942 plainly indicates the necessity of wildcatting and development drilling in excess of the 32,000 wells completed in 1941 if a serious shortage is not to develop.

THAT the industry and the state and some federal regulatory bodies are aware of the situation is evident from the events of the past few months. More interest is being displayed in stripper properties and secondary recovery than ever before. As the realization grows that new reserves are not being found in sufficient quantity, there is an added determination to make the most of the reserves now available. From the standpoint of the oil industry, getting 100,000,000 bbl. more than was originally expected out of an old field may be better than finding a new 100,000,000-bbl. field.

FOR years the water situation in the East Texas field has been a subject of considerable study. It has long been realized that failure to return water to the sand is resulting in a decrease in operating efficiency. Efforts to maintain this efficiency have been made in the past and these have been redoubled lately. In an article in the Engineering and Operating Section next week, Harry Simons reviews the problems of East Texas operators in handling the water and in another article scheduled for the February 4 issue he describes in detail the proposed water-injection projects which are calculated to add some 600,000,000 bbl. to the recoverable reserves of the field. This quantity of oil is greater than the estimated ultimate production of all but a handful of the country's largest oil fields.

ALSO in next week's issue, there will appear the second article in the series on practical refining by W. L. Nelson. This article discusses the various factors influencing the efficiency of topping plants and provides a simple mathematical equation which may be applied as a check on topping-plant operation.

CALENDAR

January

PETROLEUM INDUSTRY COMMITTEE, Marketing Committee for District 2, 624 South Michigan Avenue, Chicago, January 22, 10 a.m.

February

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, business session, Dallas, Tex., February 4, 1943.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, New York, February 15-18, 1943.

March

SOUTHERN SAFETY CONFERENCE, fifth annual meeting, Hotel Peabody, Memphis, Tenn., March 1-2.

April

AMERICAN PETROLEUM INSTITUTE, Division of Production, Eastern district, William Penn Hotel, Pittsburgh, Pa., April 8-9, 1943.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, annual meeting, Texas Hotel, Fort Worth, Tex., April 7-9.

May

PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, annual meeting, Houston, Tex., May 5-6, 1943.

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